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The Effects of Supporting Self-Efficacy on Sodium Levels, Blood Pressure Levels, and Health Behaviors in High-Risk Blood Pressure Groups, Thailand

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Abstract

Hypertension remains a critical public health challenge globally and in Thailand. Elevated sodium intake is a major contributor to rising blood pressure, especially among individuals at high risk. Methods: A quasi-experimental study included participants aged 35–59 with blood pressure of 130–139/85–89 mmHg. The experimental group's health behaviors, blood pressure, dietary sodium intake, and urinary sodium were assessed after participating in a 12-week self-efficacy program. Urine sodium, blood pressure, and health behaviors were measured. Statistical analysis employed paired samples and independent t-tests.Results:The experimental group demonstrated significant improvements: urinary sodium levels dropped from 3480.0+1488.9 to 1845.9+955.1 mg/day, systolic pressure from 138.0+3.1 to 124.4+5.6 mmHg, and diastolic pressure from 87.7 + 1.7 to 77.7+3.0 mmHg. Health behavior scores increased markedly. The control group showed no significant changes. Conclusion: Self-efficacy-based interventions effectively reduce sodium intake and blood pressure while promoting healthier behaviors in at-risk populations.

Keywords: *High-Risk Hypertensive Person, Self-Efficacy Program, Urinary Sodium, Blood Pressure, Health Behavior.*

Introduction

The World Health Organization reported an increase in the prevalence of hypertension globally, which exceeds one billion individuals currently. By 2030, the United Nations (UN) expects to accomplish a 30% decrease in non-communicable disease (NCD)-related premature mortality. Projections indicate that 1.5 billion people will be affected by 2025, with two-thirds of the affected population residing in developing nations. Moreover, 7.5 million individuals succumb to hypertension annually (Roth et al., 2017; Zhou et al., 2017). The report was found in low- and middle-income countries (LMICs). In 2010, it was estimated that 1.39 billion people globally (31.1%) suffered from hypertension. Adults with hypertension were more likely to have it in LMICs (31.5%) than in high-income nations (349 million individuals). One of the nine global goals is to decrease the incidence of hypertension in newly diagnosed patients to 25.00% by

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2025, focusing on early prevention and incidence control. The overwhelming body of research demonstrating the link between sodium intake, blood pressure, and cardiovascular disease supports these global recommendations for population-wide sodium reductions (He et al., 2013; Jayedi et al., 2019; Saxena et al., 2018).

Thailand 's NCD problem is a serious health issue. The Ministry of Public Health's report on the non-communicable disease division, hypertension, recorded the second highest mortality rate among non-communicable diseases between 2018 and 2020, with a death rate of 134.0 per 100000 population (MoPH, 2022). According to the results of the Sixth National Health Examination Survey conducted in 2019 and 2020, 24.7% of Thai individuals had exorbitant hypertension (Aekplakorn et al., 2021).This trend aligns with the prevailing pattern of rising sodium intake among the general population (Division of Non-Communicable Disease, 2016). The sodium intake of Thai citizens can reach 4,351.7 mg/person/day, which is double the WHO recommendation of 2,300 mg. The mean daily sodium intake of individuals with hypertension was 7.76 grams (S.D. 4.57) (Opasanant & Sukwong, 2023). The goal of Thailand's 2015–2025 strategic plan to reduce sodium intake is for the average daily consumption of sodium among those over the age of 18 to decrease by 30% from 2010 to 2025 and for people in Thailand to consume no more than 3046 mg (MoPH, 2025). It is associated with increased blood pressure because foods high in sodium stimulate the release of hormones named natriuretics and have the effect of increasing vascular tension, causing water and sodium retention, increasing the blood volume in the body, and causing higher blood pressure levels (Grillo et al., 2019). For each 1-g increase in estimated sodium excretion, regression analysis revealed elevations of 2.11 mmHg in systolic blood pressure and 0.78 mmHg in diastolic blood pressure (Mente et al., 2014). It was found that consuming more sodium than necessary increased the risk of high blood pressure by six times (Abegaz et al., 2018). High blood pressure levels directly correlate with higher sodium intake, affect the kidneys, and increase the risk of coronary heart disease and stroke (Jayedi et al., 2019; Kuwabara et al., 2019; Raj et al., 2016; Wang et al., 2020). Failure to control blood pressure can lead to high blood pressure within four years. For each 20 mmHg increase in systolic blood pressure, an increase of 10 mmHg in diastolic blood pressure increases the chance of death by 1.8 times due to ischemic heart disease and stroke (Huang et al., 2014).

To mitigate the patient population from at-risk groups, the Ministry of Public Health mandates screening for blood pressure among individuals aged 35. Individuals who have a systolic blood pressure between 120–139 mmHg and/or a diastolic blood pressure between 85–89 mmHg are at high risk of hypertension. However, developing hypertension is preventable with regular blood pressure reduction or lifestyle modification (Kebede et al., 2022). Sukhothai accounted for the second-highest prevalence of hypertension among health regions. Specifically, the study revealed that the incidence of hypertension in the Khiri Mat district was the highest among all districts within Sukhothai province. The corresponding values for 2018–2020 were as follows: 19,792.17, 19,845.04, and 19,468.04 per 100000 population. For 2018–2020, the corresponding rates for high blood pressure risk groups were as follows: 4,371.07, 4,278.85, and 4,4.77.07 per 100000 population, respectively (Sukhothai Provincial Public Health Office, 2020). High-risk hypertensive person (BP=130-139/85-89 mmHg) and hypertension (BP=140-159/90-99 mmHg) in individuals 35 years of age and older were found to have screening findings of 143.46 and 427.37 per 100000 population, respectively. Based on this information, the researcher is interested in designing activities for populations at risk for high blood pressure in the study area to prevent high blood pressure in the future. The objective was to evaluate the effects of a self-efficacy program on urinary sodium levels, blood pressure, and health behaviors of high-risk

hypertensive patients. and to compare sodium levels, health behavior, and blood pressure in the experimental group Before and after the experimental group and the control group in people with high blood pressure.

Methodology

Study Design

This was a quasi-experimental study employing a pretest-posttest design with two groups.

Participation Recruitment

A purposive sample was chosen based on the subsequent inclusion criteria: individuals falling within the high-risk hypertensive person as defined in the 2020 registry of high blood pressure risk groups in Khiri Mat district, Sukhothai province, with systolic blood pressure ranging from 130 to 139 mmHg and diastolic blood pressure from 85 to 89 mmHg as defined by the Hypertension Association of Thailand (Thai Hypertension Society, 2023), encompassing both males and females aged 35 to 59 years; possessing the ability to communicate and comprehend Thai language; and being willing and voluntarily to participate in the project. Using the G* Power program, the sample group computed and ascertained the sample size, culminating in a sample of sixty individuals, thirty of whom were assigned to the experimental group and thirty to the control group. Data was gathered in two distinct locations to mitigate the risk of data contamination by the researchers. Comparable in context, the experimental group was administered at Sri Khiri Mat Subdistrict Health Promoting Hospital, while the control group was administered at the Tanot Subdistrict Health Promoting Hospital. After procuring the samples by the predetermined criteria, they are matched based on their most comparable attributes:

1) the disparity between the systolic and/or diastolic blood pressure readings does not exceed five mmHg.

2) No more remarkable than a five-year age difference; and

3) Gender.

Research Hypothesis

1. The levels of sodium were greater in the experimental group that was administered the self-efficacy program. Health behaviors and blood pressure levels changed following the 12-week experiment compared to before.

2. The experimental group that participated in a program to enhance self-efficacy, health behaviors, urinary sodium, and blood pressure levels differed in the experimental group compared to the control group of high-risk hypertensive persons.

Research Theoretical Paradigm

The research employed self-efficacy theory, which posits that self-efficacy evaluates one's capability to execute tasks to attain practical capabilities (Figure 1) (Bandura, 1997) (Bandura, 1997). Practical abilities are conceptualized as objectives within contexts, mental processes that link knowledge with behavior, and significant determinants that impact actual practice. A person's decision to abstain from a particular behavior is determined by 1) their expectations of

the outcome and 2) their beliefs in their efficacy. Four fundamental sources support the learning process: 1) experience of active mastery, 2) experience of vicarious mastery, 3) verbal persuasion, and 4) affective and physiological states (Bandura, 1997). After learning through such resources, a person uses cognitive processes. Select information from sources of interest and reliability and combine that information in making decisions about one's abilities. Self-efficacy is a psychological term frequently linked to the capacity to manage chronic illnesses. Numerous domains have demonstrated its significant influence, including health-related behavior (e.g., smoking cessation relapse), pain experience and treatment, eating habits and weight control, effective myocardial infarction recovery, and adherence to preventative health programs. Additionally, research highlights the critical function that perceived self-efficacy plays as a cognitive element influencing health (Warren-Findlow et al., 2012). The study designed a program to enhance self-efficacy to give groups at risk before high blood pressure the opportunity to learn. Experience incorrect behavior and receive persuasive words within realistic limits. Building confidence in one's abilities and receiving physiological and emotional support are essential. According to the program, four ways to enhance self-efficacy awareness through various activities can control hypertension. Blood pressure can be lowered, and correct health behavior occurs by consuming anti-hypertensive foods and exercising.

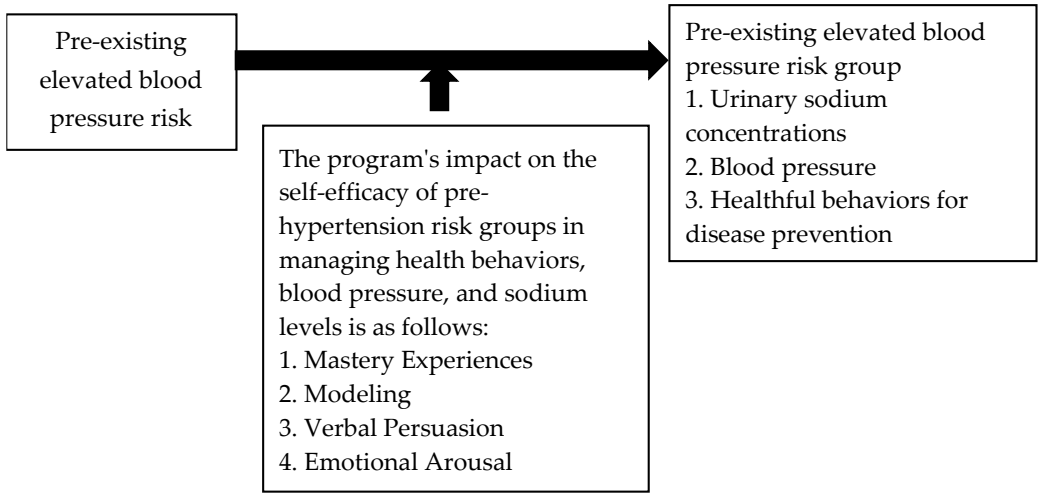

Figure 1. Research Framework Using the Application of Bandura's Theory (Bandura A, 1997).

Design

The experimental group received an intervention and was collected during weeks 1 and 12. The experimental design and research model stipulated that the control group had routine care and a follow-up assessment after the twelfth week (Figure 2).

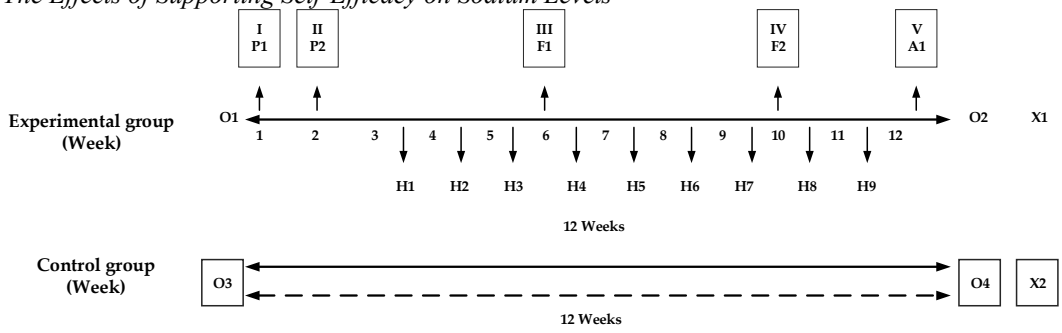

Figure 2. Research Design and Experimental Plan

By designating O1 and O3 as pre-experimentation data collection, O2 and O4 refer to data collection following the experiment. The 12-week self-efficacy-building program was denoted as X1 and X2, indicating that they received routine medical care. Following the program, P1-P2-P3 denoted three training and knowledge exchange activities in weeks 1, 2, and 12. F1-F2 denoted conducting home visits to assess outcomes, such as monitoring blood pressure and urinary sodium levels and encouraging healthy behaviors twice during weeks 6 and 10.

A1 denoted the activities conducted in the experimental group during week 12 to assess various outcomes, such as sodium intake, blood pressure, and health behaviors.

The experimental group's descriptors were H1 to H9, which tracked exercise, calculated daily food intake, and recorded household food practices. The researcher oversaw and motivated participant conduct via the LINE group and offered weekly individual counseling by telephone from weeks three to eleven.

The research tool was a questionnaire consisting of two parts:

Part 1: The general information questionnaire includes age, gender, marital status, occupation, income, highest Level of education, comorbidities, smoking, blood pressure level, and dietary sodium.

Part 2: Health Behavior Assessment includes daily routines, food consumption, and exercise. Five experts examined the questionnaire's content for validity. The score was 0.81, and the confidence value using the alpha coefficient was 0.84. The question type was a multiple-choice answer with one answer and a rating scale of 5. The Level has 30 questions, divided into 17 positives and 13 negatives. We divided health behaviors into five levels: practices 6-7 days, 4-5 days, practices 3 days, practices 1-2 days, and no practices. Positive and negative questions received scores of 5 to 1 and 1 to 5, respectively.

2. The data for this analysis were based on the following characteristics of the experimental and control groups: 1) Compute the daily sodium content in mg of urine over 24 hours, including 12 hours of overnight monitoring. 2) Conduct a continuous blood pressure measurement to ascertain blood pressure. Take the average systolic and diastolic blood pressure in mmHg from the same arm in the same position at least twice, 15 minutes between each measurement. The range of measurements is defined as follows: Between 120 and 80 mmHg was optimal. High blood pressure was 130–139 and 85–89 mmHg, whereas normal blood pressure was 120–129 and 80–84 mmHg, as recommended by the Hypertension Association of Thailand (Thai Hypertension Society, 2023), 3. The experimental instrument was a researcher-developed program to increase

self-efficacy in high-risk hypertensive persons, which adhered to Bandura's (1997) self-efficacy theory and has been reviewed by experts (Thai Hypertension Society, 2023). One physician oversees the non-communicable disease clinic, two public health officials are employed at the sub-district health promotion facility, and one lecturer supervises the group of five individuals. The program instrument comprises three components:

Develop a strategy for coordinating self-efficacy-building activities utilizing the following four components: 1) mastery experiences, 2) modeling, 3) verbal persuasion, and 4) emotion.

The following are lessons learned regarding the provision of intensive group knowledge via explanations from physicians and nurses, practice exercises, demonstrations, and group discussions gleaned from a variety of lessons:

- Information on blood pressure in the subject of hypertension is presented to facilitate an understanding of the risks and consequences of high blood pressure, significant risk factors for hypertension, and health behaviors that are not conducive to the development of hypertension.

- Sodium dangerous with content: Understand the difference between sodium and salt, the risks associated with consuming an excessive or insufficient amount of sodium from an unreliable source, and the body's sodium needs. Additionally, a salt meter should be utilized to verify the sodium content of meals.

- "Be cognizant of the sodium levels in meals": Provide data utilizing food sodium metrics to enhance awareness, delineate information sharing, and promote group dialogues.

- Reducing sodium intake by fifty percent can be accomplished by selecting low-sodium foods (five steps to five grams), scrutinizing nutritional labels, performing basic sodium content calculations and measuring seasonings, illustrating cooking techniques to minimize sodium, reformulating recipes, and engaging in tongue brushing to enhance taste perception.

A practice handbook and advice on preventing high blood pressure were included to provide the experimental group with directions when participating. The handbook contained both text and pictures. Specifically, it gave information about high blood pressure and its effects. High blood pressure approaches could be implemented to control and reduce blood pressure levels. These techniques included limiting sodium consumption, selecting anti-hypertensive meals, engaging in physical activity, and managing stress through breathing exercises.

The range of values for a sodium level meter was as follows: 0.3 – 0.6% = slightly salty, 0.8 – 1.0% = salty, and 1.3 – 2.0% = extremely salty. The meter measured the amount of sodium in food.

Phone follow-up, house visit, and home practice records encompassing exercise and diet records.

Data Collection

The following procedures were used by the researcher when collecting data:

1. Data collection for one week before the experiment since the research team included a single professional nurse who helped with participant scheduling, area setup, and weekly activity planning, in addition to research assistants for data collection. Before the examination, the experimental and control groups' data comprised questionnaire-based assessments of dietary and activity habits, blood pressure, weight, and height taken twice every 15 minutes, as well as a

urine sodium test performed overnight and for 12 hours.

2. Data were collected for 12 weeks while the experimental group underwent a self-efficacy development program that utilized the notion of self-efficacy (Bandura, 1997). The following were the experimental protocols:

Week 1 (P1): Three hours of Activity 1 Before beginning the knowledge exchange training activities, the researcher discovered that the experimental group had explained how they established expectations for the results of their practice and how they set shared goals, which included lowering blood pressure, urine sodium levels, and improving health behavior, which include: 1) with the use of visual media and a PowerPoint software, the "HT Knowledge" course imparted information and comprehension regarding hypertension, including its causes, risk factors, improper health behaviors, and blood pressure control by qualified medical professionals. All set to hand out flyers regarding hypertension. After examining the risk factors for high blood pressure, the experimental group was divided up into subgroups of seven to eight individuals so they could communicate, identify potentially worrisome signs, and work together to find solutions, 2) distribute guides for altering health habits by the three principles to regulate blood pressure levels and practice blood pressure control skills using the three principles (food, exercise, and stress), 3) The lesson “Sodium Dangerous” provides knowledge and attitude about consuming foods with high sodium content, understanding the difference between salt and sodium, the necessity of sodium for the body, dangers when receiving inappropriate sodium (little/ a lot), sources of sodium that the body receives, demonstration of using a salt meter to show the amount of sodium contained in food and as information to support decision-making in self-care, handing out leaflets for reduced-sodium foods, practicing reading food item labels, practice measuring seasonings, brushing the tongue to improve sensitivity to salty taste by the researcher demonstrating and having the experimental group demonstrate back and forth under the supervision of the researcher to build confidence in practice.

Week 2 (P2): Three hours of Activity 2 The experimental group's emotional readiness is as follows: 1) Have the experimental group evaluate their behavior based on lessons learned from the model and invite role models to share their experiences in lowering blood pressure risk factors. 2) "Sodium, you are" lesson, which includes selecting low-sodium meals (5 steps to 5 grams) and doing a quick calculation of sodium content. 3) The "How to Reduce" lesson walks through how to cook to cut down on sodium, reformulate recipes to cut down on sodium by using a salt meter to measure the amount of sodium in food, and work with others to create healthy meal plans for populations at risk for high blood pressure. The researcher carries out the following tasks: Before continuing to practice at home, promote group interaction, stimulate reflection on various concerns, offer support, and go over health behavior skills. To facilitate good communication and encourage changes in health-related behavior, the researcher provided the experimental group with a phone number so that they could talk to her about their issues.

Weeks 3 through 11 (H1–H9): continued at-home activities; the experimental group went back to modify their eating and exercise routines, and during the experimental period, they recorded their behavior at home. The researcher followed up with them, encouraging them to practice behavior in groups and receive individual counseling by phone once a week. They also spent 5–10 minutes asking questions about challenges and working together to solve problems, talking to encourage and praise what can be done, and being able to act appropriately, which included stimulating and persuading those who were still not acting appropriately and assessing their progress in changing their behavior.

Week 6 (F1): Three days were devoted to the first home visit. To monitor and assess the health habits of all experimental groups, the researcher conducted ten daily home visits in follow-up. Blood pressure and sodium in the diet, questions concerning barriers to blood pressure and sodium control in each experimental group, guidance when issues arise, and commendation and support for adopting proper healthy behaviors are all included.

Week 10 (F2): During the second home visit, three days passed. The researcher conducted ten daily home visits to monitor and evaluate each experimental group's blood pressure, dietary sodium, and health habits. They inquired about issues and challenges faced, offered guidance when issues arose, and boosted spirits to establish consistency in consistently regulating food and exercise habits.

Week 12 (A1): This marked the end of the experiment, and participants exchanged information for one hour and thirty minutes. The experimental group was given a review of blood pressure information by the researcher, who also shared their experiences after modeling and modifying healthy behaviors to control blood pressure and sodium levels in food, as well as the expected outcomes of these behavioral practices in preventing hypertension. The experimental group had a 12-hour overnight urine sodium test, two blood pressure readings spaced 15 minutes apart, and a health behavior questionnaire evaluation as part of the post-study data-gathering process. It provided blood pressure and urinary sodium readings. Encourage the group to try new things, offer support, and commit to one another to behave responsibly.

3. Control group: The researcher provided routine services and collected data on blood pressure, urine sodium, and health-related activities.

Week 1: First activity: The researcher gave a broad overview of high blood pressure, nutrition, exercise, and stress reduction before beginning the study. The control group talked about exercises, modeled acceptable conduct, offered guidance on how to get better at it, and acknowledged good behavior. The control group was then given a health behavior evaluation to complete, and the researcher set a meeting date for week twelve. The researcher gathered information after the trial, which concluded in week 12 (the second activity), including taking a blood pressure reading. A 12-hour urine sodium measurement was done overnight, two blood tests spaced 15 minutes apart, and a questionnaire was used to gauge health behavior. To protect the rights of the sample group, the researcher arranged activities for the control group under the program after the research was over.

Data Analysis

Use the following software to analyze data:

1. The sample group's data determine averages, percentages, and frequencies for analysis.

2. Using paired t-test statistics, compare the mean scores of the experimental group's health behaviors, blood pressure, and urinary sodium before and after the 12-week experiment.

3. Utilizing the independent t-test, compare the mean urine sodium scores, blood pressure, and health behaviors between the experimental and control groups before and following the 12 weeks of the study.

Human Research Ethical Considerations: Considered and approved by Sukhothai Provincial Public Health Office (IRB No. 73/2020).

Results

Part 1: General information and sample characteristics were similar between the experimental group and the control group: 73.3 % of the sample was female, the average age was 56.5 years (S.D. = 6.8), and 53.8 years (S.D. = 5.2), most of the sample was married (63.3%), the majority practiced Buddhism, the average monthly income was 116 US.D. (S.D. = 41) and 122 US.D. (S.D. = 48), the majority of the sample was female (63.3%), the majority was Buddhist (100.0%), the majority were employed in agriculture (63.3% and 46.7%), the BMI was in the range of 23.0 - 24.9 kg/m^2 (overweight), the amount of sodium in urine in 24 hours equal to 3479.1 (S.D. = 1488.9) and 3416.9 (S.D. = 2421.3), the mean systolic pressure was 134.2 mmHg and 134.6 mmHg (S.D. = 3.1). There was a diastolic of 85.3 mmHg (S.D. = 3.3) and 85.0 mmHg (S.D. = 2.5). 30.0% and 50.0% of the direct relatives were found to have high blood pressure, whereas 70.0% and 83.7%, respectively, did not have any congenital illness. Furthermore, many individuals in both groups abstained from smoking (86.7 and 80.0%), and 76.7% and 63.3% did not consume alcohol.

Part 2 compares the variations in blood pressure, health behaviors, and urine sodium levels across the experimental groups before and after the 12-week study.

The program's experimental group discovered that the mean 24-hour urine sodium levels were 3480.00 (S.D.=1488.9) and 1845.8 (S.D.=955.1) before and after the 12-week experiment period. The blood pressure readings before and after the program were 138.0 (S.D.=3.1) and 124.4 (S.D. = 6.0) mmHg, respectively. Diastolic blood pressure readings were 87.7 (S.D.=1.7) and 77.7 (S.D.=3.0) mmHg, and there was a significant difference at the $p<.05$ Level. The mean diastolic pressure and the mean systolic pressure were observed to vary statistically significantly at the.05. Health-related behavior After completing the program for 12 weeks, the mean score for disease prevention ($\bar{x}$ = 109.5, S.D. = 2.6) was more significant than it was before the investigation ($\bar{x}$ = 45.9, S.D. = 2.2). There is a statistically significant difference in health behavior ($p < .05$), shown in Table 1.

Self-efficacy	**Before the experiment $\bar{x} \pm$S.D.**	**After the experiment $\bar{x} \pm$S.D.**	**Significance level**
Urinary sodium	3480.0 ± 1488.9	1845.9 ± 955.1	P < .05*
Systolic blood pressure (mmHg)	138.0 ± 3.1	124.4 ± 5.6	P < .05*
Diastolic pressure (mmHg)	87.7 ± 1.7	77.7 ± 3.0	P < .05*
Health behavior	45.9 ± 2.2	109.5 ± 2.6	P < .05*

Table 1. Mean Urinary Sodium, Blood Pressure, and Health Behaviors within the Intervention Group before and 12 Weeks after the experiment (n=30).

* Significant levels at .05

Before and after the 12-week experiment period, the control group of the program found that the mean 24-hour urine sodium levels were 3416.9 (S.D. = 2421.3) and 3219.4 (S.D. = 1004.5), respectively. The participant's blood pressure values before and after the program were 137.5 (S.D. = 3.3) mmHg and 137.2 (S.D. = 2.6) mmHg, respectively. According to Table 2, the readings for diastolic blood pressure were 87.0 (S.D. = 1.5) and 88.0 (S.D. = 1.5) mmHg. Additionally, the mean score for disease prevention ($\bar{x}$ = 45.3, S.D. = 2.0) was higher than before

the investigation ($\bar{x}$ = 44.0, S.D. = 1.6). However, there was no significant difference (P > .05) between the before and after the experiment, as shown in Table 2.

Self-efficacy	**Before the experiment $\bar{x}$ ±S.D.**	**After the experiment $\bar{x}$ ±S.D.**	**Significance level**
Urinary sodium	3416.9 ± 2421.3	3219.4 ± 1004.5	P > .05
Systolic blood pressure (mmHg)	137.5 ± 3.3	137.2 ± 2.6	P > .05
Diastolic pressure (mmHg)	87.0 ± 1.5	88.0 ± 1.5	P > .05
Health behavior	45.3 ± 2.0	44.4 ± 1.6	P > .05

Table 2. Mean Urinary Sodium, Blood Pressure, and Health Behaviors within the Control Group before and 12 Weeks after the experiment (n=30).

* Significant levels at .05

Part 3: Comparison of differences in urinary sodium, blood pressure, and health behaviors between the experimental and control groups before and after the 12-week experiment.

The experimental group had an average 24-hour urine sodium amount of 3480.0 ± 1488.9 and 1845.9 ± 955.1 mg/day. In contrast, the control group had an amount of 3416.9±2421.3 and 3219.4 ± 1004.5 mg/day that was significantly different (p < .05). This was determined by comparing the sodium levels in the urine of the two groups before and after the experiment. By comparing the mean systolic blood pressure of the experimental group before and after the experiment, the values were determined to be 138.0 ± 3.1 and 124.4 ± 5.6 mmHg, respectively. Additionally, there was a statistically significant difference (p<. 05) in the control group's measurements, which were 137.5 ± 3.3 and 137.2 ± 2.6 mmHg. The experimental group's mean diastolic blood pressure was measured at 87.7 ± 1.7 and 77.7 ± 3.0 mmHg, whereas the 87.0 ± 1.5 and 88.0 ± 1.5 mmHg values were discovered. The mean diastolic and systolic pressure showed significant differences (p < .05). When comparing the mean scores of the experimental group's health behaviors to those of the control group before the program's implementation, no differences were found. However, following a 12-week program participation period, the experimental group's mean score ($\bar{x}$=109.5, S.D.=2.6) was higher than the control group's 12-week program mean ($\bar{x}$=44.4, S.D.=1.3). Table 3 indicates a statistically significant difference at .05. Level.

Self-efficacy	**Experimental group $\bar{x}$ ±S.D.**	**Control group $\bar{x}$ ±S.D.**	**Significance level**
Urinary sodium Before the experiment	3480.0 ± 1488.9	3416.9 ± 2421.3	P > .05
After the experiment	1845.9 ± 955.1	3219.4 ± 1004.5	P < .05*
Systolic blood pressure (mmHg)			

Before the experiment	138.0 ± 3.1	137.5 ± 3.3	P > .05
After the experiment	124.4 ± 5.6	137.2 ± 2.6	P < .05*
Diastolic blood pressure (mmHg)			
Before the experiment	87.7 ± 1.7	87.0 ± 1.5	P > .05
After the experiment	77.7 ± 3.0	88.0 ± 1.5	P < .05*
Health behavior			
Before the experiment	45.9 ± 2.2	45.3 ± 2.0	P > .05
After the experiment	109.5 ± 2.6	44.4 ± 1.3	P < .05*

Table 3. The Differences in Mean Urinary Sodium, Blood Pressure, and Health Behaviors Between the Experimental and Control Groups before and after Receiving the Program (n=30).

* Significant levels at .05

Discussion

The program significantly decreased the average systolic and diastolic blood pressure compared to the period before participation ($p < .05$). This outcome is attributed to the program's application. Based on Bandura's self-efficacy theory (Bandura, 1997), the self-efficacy of the sample has shown a rise. In the initial stage of the study (Week 1), the researchers established goals and tangible results to change attitudes about sodium intake. 1). Providing factual data on the sodium content of meals to provide information for self-care purposes, 2). Activities focused on disseminating knowledge and cultivating attitudes that encourage healthier behaviors, such as educating individuals about blood pressure and other risk behaviors through media, pre-designed programs, brochures, and manuals on hypertension and the health impacts of sodium in food, 3). Social support is provided through various activities, such as having role models in the healthcare field, involving participants in analyzing the behavior of these role models in controlling blood pressure, public health officers also conduct home visits, demonstrating cooking techniques to reduce sodium intake, and modifying recipes. Additionally, behavioral changes are encouraged through online platforms like Line groups, where participants can seek advice, ask questions, and receive encouragement. At the end of the study (Week 12), the sample group is praised and encouraged for successfully adjusting their behavior. The study team provided the experimental group with data obtained from the evaluation by comparing their systolic and diastolic blood pressure and the quantity of sodium in their urine before and after participating in the program. To facilitate the sample group's observation of data discrepancies and the development of guidance for decreasing blood pressure and modifying sustainable health behavior programs in the future.

The experimental group's blood pressure and urine sodium levels were considerably lower than those of the control group ($p < .05$), according to the research comparing the two groups. To develop knowledge and comprehension of the risks and consequences of high blood pressure, important risk factors, and improper behaviors suited for high blood pressure, the first two weeks of the program's activities employ an intense group education approach. Furthermore, the body's

need for sodium highlights the risks associated with improper consumption. According to research by Nakano et al. (2016), the intervention group's urine sodium levels decreased significantly when they received extensive 12-week sodium restriction education from a nutritionist. Systolic blood pressure from Ambulatory BP monitoring (ABPM) declined after the study and reduced more than the control group, with statistical significance for the control group ($p < .05$)

Furthermore, the experimental group was exposed to front and rear demos to enhance their skills. Sharing information and making decisions facilitates the experimental group's ability to communicate with the medical staff, develop a shared understanding, and utilize that understanding. This is consistent with the findings of research conducted in 2017 by Bhana et al. (2018), which showed that knowledge, attitudes, and behaviors are inversely correlated with sodium consumption in food. Although consumers know the adverse health effects of consuming large amounts of sodium, they lack a basic understanding of the recommended dietary intake, the primary food sources, and the connection between salt and sodium (Nam et al., 2016). The researcher gave the experimental group skills to practice measuring condiments, brushing the tongue to increase the sensitivity of the tongue's sense of salty taste, choosing food, and following a personal model. Low sodium and recipe modification to lower sodium intake via delivering salt measurement strips in meals and teaching people how to prepare food to lower the sodium content so they can make it home. Measuring sodium in meals produces feedback, or "biofeedback," which increases awareness and prompts behavioral changes to reduce sodium intake. It is comparable to the research conducted by Irwan et al. (2016), which showed that using a salt meter as a self-care decision assistance tool improved self-care knowledge, attitudes, and practices (Ng et al., 2016). Moreover, there was a statistically significant improvement in self-care skills, and the research conducted by de Brito-Ashurst et al. (2013) examined individuals with chronic renal disease following their instruction in cooking low-sodium meals. The review showed how education and awareness-raising programs at the population level can decrease or enhance salt-related behaviors and/or intake (de Brito-Ashurst et al., 2013). Sodium and potassium intake, knowledge, attitudes, and behavior towards salt consumption amongst adults in Podgorica, Montenegro. The study also found that the sample's blood pressure decreased more than that of the control group with statistical significance ($p < .05$) following the conclusion of the four-week trial. There was a statistically significant difference ($p < .05$) between the systolic and diastolic blood pressures of the program-received and routine nursing care groups.

The average score for the experimental group's health behavior after completing the activity for 12 weeks was considerably higher than for the control group before the experiment. Through role models that the experimental group may directly interact with and emulate, the researcher offers knowledge and guidance on practicing each component of health behavior. Thus, according to theory, giving the experimental group a chance to approach the experience of engaging in healthy behaviors as a vicarious experience led to a learning process. [20] Furthermore, it was discovered that providing the experimental group with an active mastery experience through skill practice and experience reviews through practice that had been completed successfully led to the group's learning, increased confidence, and ability to practice correctly at home. [20] It aligns with an education that enables individuals to practice desired behavior and share mastery and competence in the outcomes (achievement, status, and self-efficacy), which raises a person's perceived competence and desired conduct (Yeung et al., 2014). Furthermore, it was shown that chatting gave the experimental group more self-assurance and allowed them

to use their full ability to raise their self-efficacy by persuading them with plausible but reasonable phrases.

Self-assurance in one's abilities is demonstrated through verbal persuasion by the researcher using persuasive language, asking the experimental group to discuss challenges they face in implementing their health behaviors, having groups collaborate to find solutions, and offering encouragement by expressing gratitude when the group completes tasks. It was successful and encouraging when the experimental group had difficulties and roadblocks or required explanation while participating in the program. It made the experimental group feel more motivated and enabled them to put in more effort and ask questions. The investigator provided the experimental group with contact numbers so that they could serve as consultants, asking questions about health habits and listening to issues and barriers to implementing activities. It resulted in a resolve to engage in healthy practices consistently. As previously indicated, the self-efficacy promotion program's outcomes included a change in health-related behavior and a drop in blood pressure and sodium levels in the samples. This is because individuals think they can accomplish such goals if they are taught and equipped with the necessary abilities (Ng et al., 2016).

Conclusion

The program's outcomes improve self-efficacy in managing sodium levels, blood pressure, and health behaviors among pre-hypertension risk groups in four ways: 1. Mastery Experiences: acquiring knowledge and skills via firsthand experience and tangible outcomes from practical application; 2. Modeling: Acquiring knowledge and skills by studying and emulating models and the experience of developing hypertension, 2. Modeling: Acquiring knowledge and skills by studying and emulating models and the experiences of others, 3. Verbal persuasion: utilizing strategies such as offering praises, delivering persuasive speeches, and providing advice, 4. Emotional stimulation: providing reinforcement and support. Engaging in a 12-week program focused on developing positive connections led to a notable improvement in individuals' belief in their ability to adopt healthy habits, particularly in lowering salt intake. This reduction in sodium consumption resulted in a substantial drop in the quantity of sodium found in urine and a decrease in both systolic and diastolic blood pressure levels among those at risk of pre-hypertension significantly at the .05 Level.

Implications for Research and Practice

In addition to the self-efficacy development activity plan program, which comprised four data sources: 1) Mastery Experiences, 2) Modeling, 3) Verbal persuasion, and 4) Emotional Arousal. Another critical factor is the involvement in activities that involve the development of nutritious menus for participants and using social media to create a network among groups to exchange experiences. An independent method of obtaining empirical data is training in sodium testing abilities for food and urine. These activities enhance the self-care competence of the risk group in more sustainable trends by transforming attitudes and intentions toward behavioral changes.

Credit Authorship Contribution Statement

Rattawan Somporn: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Project administration, Methodology, Conceptualization.

Niphon Jhitanukool: Project administration, Methodology, Conceptualization, Formal analysis, Resources, Software, and Data curation.

Sanhawat Chaiwong: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Methodology, Investigation, Data curation, Conceptualization.

Declaration of Competing Interest

The author(s) declared no potential conflicts of interest concerning this article's research, authorship, and/or publication.

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