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The Effect of A Dietary Selection Promotion Program on Blood Pressure Among Hypertensive Inmates: A District Prison in the Upper Southern Region

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Abstract

Hypertension is a prevalent health issue among incarcerated populations and is closely linked to poor dietary habits. Despite existing prison healthcare services, many inmates continue to engage in unhealthy food consumption, particularly through welfare shop purchases. Quasi-experimental study aimed to investigate the impact of a dietary selection promotion program on blood pressure levels among hypertensive inmates in a district prison in the upper southern region of Thailand. A 12-week intervention was implemented among 78 incarcerated individuals with hypertension, randomly assigned to experimental and control groups (39 participants each). The program was based on the Health Belief Model (HBM) and included group education, experience sharing, and a peer-supported "buddy system". Data were collected using questionnaires, food frequency records, and blood pressure monitoring. Statistical analyses included Chi-square, Fisher's exact test, paired t-tests, and independent t-tests. The study found that participants were predominantly male (82.1%) with a mean age of 46.28 years (SD = 9.29). Post-intervention, the experimental group showed a significant reduction in both systolic (132.79 ± 9.41 to 123.49 ± 11.08 mmHg) and diastolic (86.44 ± 7.76 to 77.23 ± 8.10 mmHg) blood pressure ($p < 0.05$). Furthermore, their post-intervention blood pressure levels were significantly lower than those in the control group (systolic: 123.49 ± 11.08 vs. 137.56 ± 14.54 mmHg; diastolic: 77.23 ± 8.10 vs. 89.87 ± 9.16 mmHg, $p < 0.05$). Thus, the dietary selection promotion program effectively reduced blood pressure among hypertensive inmates by fostering informed food choices and peer support. Integrating such interventions into routine prison healthcare may enhance chronic disease management and reduce hypertension-related complications.

Keywords: Dietary selection, Hypertension, Incarcerated individuals, Health Belief Model, Prison health

Introduction

Hypertension is a leading risk factor for global mortality and disability. According to the World Health Organization (WHO), the prevalence of hypertension among individuals aged 30 - 79 doubled over the past three decades, and in 2019, it accounted for 19.2% of global deaths (WHO, 2023; Ranzan et al., 2022). Reducing the prevalence of hypertension by 33% by 2030 is a key global target for controlling non-communicable diseases (NCDs) (WHO, 2023). In Thailand, the sixth National Health Examination Survey (2019 - 2020) reported that 25.4% of individuals aged 15 and older—approximately 13.8 million were diagnosed with hypertension, reflecting a continued increase from 24.7% in 2014 (Department of Disease Control, 2022).

Globally, approximately 11.5 million individuals are incarcerated (World Prison Brief, 2021), and this population is disproportionately affected by hypertension. In the United States, the prevalence of hypertension among inmates is 1.5 times higher than that of their non-incarcerated counterparts (Association of American Medical Colleges, 2023). In Thailand, 90% of inmates treated for circulatory diseases were diagnosed with hypertension (Wojanasara & Archavanitkul, 2021). The prevalence of hypertension among Thai inmates has also risen, from 3.88% in 2022 to 5.02% in 2023, with the Upper Southern Region accounting for 60% of hypertensive cases in the South and 18% located in district prisons (Department of Corrections, 2023).

Hypertension management in prisons typically involves routine screening, follow-ups, and pharmacological treatment (Wojanasara & Archavanitkul, 2021). While physical activity programs are available (Office of the Permanent Secretary, Ministry of Public Health, 2021), poor dietary habits remain a significant barrier to effective hypertension control (Thanakiattisakoon, 2023). Excessive intake of sodium, fats, and carbohydrates can significantly raise blood pressure and increase risks of cardiovascular, renal, neurological, and visual complications (Phuengsema, 2022; Food and Drug Administration, 2024; Blood Pressure UK, 2021; Thai Health Promotion Foundation, 2022).

Inmates typically consume food from two primary sources: Daily prison meals and purchases from welfare shops. While official prison meals follow nutritional guidelines that limit processed foods and sugar (Department of Corrections, 2022), welfare shops offer salty seasonings, processed foods, snacks, and sugary drinks, commonly linked to hypertension.

Although various interventions, such as low-sodium and DASH diet programs, have demonstrated efficacy in community settings (Saengthong, 2023; Khongkaew et al., 2022; Moonsan, 2017), research specifically targeting dietary behavior among hypertensive inmates is scarce. The Health Belief Model (HBM) has effectively promoted hypertension-related behavior change in community settings by enhancing perceived risk and benefits (Chonsin et al., 2016; Khongkaew et al., 2022).

Most prison-based studies have been descriptive, focusing on hypertension prevalence, health literacy, or quality of life (Timnou et al., 2019; Thanakiattisakoon, 2023; Thaneerat et al., 2022). Few experimental studies exist, and none specifically address dietary behavior change among hypertensive inmates. As a community nurse practitioner working within the prison system, the researcher

recognized that many hypertensive inmates lack the knowledge and support to make healthy food choices.

This study applies the Health Belief Model (HBM) to promote appropriate food selection within prison environments, aiming to improve dietary behaviors and reduce blood pressure among incarcerated individuals with hypertension. The findings aim to inform future counseling strategies and policy development for managing chronic diseases in correctional facilities.

Research objectives

This study aimed to examine the effect of a dietary selection promotion program on blood pressure levels among incarcerated individuals with hypertension in a district prison in Upper Southern Thailand. The specific objectives were:

1) To compare the mean systolic and diastolic blood pressure levels of hypertensive inmates in the experimental group before and after participation in the dietary selection promotion program.

2) To compare the post-intervention mean systolic and diastolic blood pressure levels between the experimental and control groups of hypertensive inmates.

Methodology

Research design and setting

A quasi-experimental design with a two-group pretest-posttest approach was employed to assess the effectiveness of a dietary selection promotion program in reducing blood pressure among hypertensive inmates in district prisons in Upper Southern Thailand.

Participants

The study included incarcerated individuals diagnosed with hypertension based on ICD-10 codes I10–I15, as confirmed by prison physicians. The sample size was calculated using G*Power 3.1.9.4 with 95% power, a significance level (α) of 0.05, and effect size of 0.8. The minimum sample size was 70, and after adjusting for a 10% attrition rate, the final sample consisted of 78 participants, equally divided into an experimental group (n = 39) and a control group (n = 39). Participants were selected from four randomly chosen district prisons using stratified and paired random sampling, based on gender and severity of hypertension. Participants were eligible if they: confirmed diagnosis of hypertension, purchased food from the prison welfare shop at least once per week or four times per month, had been incarcerated for at least three months and had a remaining sentence of at least six months, able to read, write, and communicate in Thai, willing to participate and provided informed consent, no diagnosis of diabetes, and not older than 65 years. Participants were excluded if they: were unable to participate in intervention activities fully, received sentence reduction, suspension, or royal pardon during the study, or were involved in other behavioral modification programs that could influence outcomes.

Instrumentation

The study utilized both implementation and evaluation instruments, structured as follows:

Instruments for program Implementation

1) Dietary Selection Promotion Program Manual, developed by the researcher and based on the Health Belief Model (HBM), includes structured activities to promote healthy food choices among hypertensive inmates. The program comprised five group sessions, each lasting 45 - 60 min, delivered over 12 weeks (weeks 1, 2, 4, 8, and 12). Key components included: Group Education to increase perceived susceptibility and severity of hypertension and its complications. Experience Sharing to identify and reduce perceived barriers through peer discussion. Furthermore, cues to Action via a buddy system and nurse follow-up, encouraging mutual monitoring and support in food selection. 2) Hypertension Patient Handbook: "Choosing Appropriate Foods for Individuals with Hypertension". And 3) Food Consumption Frequency Questionnaire, adapted from Aekplakorn (2011), this 11-item questionnaire assessed the frequency of purchasing and consuming food items in prison welfare shops. It categorized consumption into: High (daily or 4 - 6 days/week), Moderate (1 - 3 days/week), and Low (never). Food categories included condiments, instant meals, fried foods, high-fat items, sugary beverages, snacks, and desserts.

Instruments for data collection and evaluation

1) Personal Data Questionnaire, this researcher-developed questionnaire, based on literature review, captured: Demographic information (e.g., gender, age, education, religion, incarceration duration, number of close friends in prison), and Health-related data (e.g., hypertension duration, BMI, comorbidities, current medications, blood pressure, and exercise behavior), and 2) Blood Pressure Monitoring FormSystolic and diastolic blood pressure values were recorded before and after the intervention using standard measurement procedures, conducted by trained healthcare staff.

Data collection procedure

1) Preparation Phase: Following ethical approval, the researcher sought formal permission from the wardens of four selected prisons. Eligible inmates were briefed on the study's purpose, procedures, risks, and benefits. Written informed consent was obtained from all participants.

2) Implementation Phase: Participants in the experimental group received the 12-week dietary selection promotion program as scheduled. The control group continued to receive standard care, including routine medical check-ups and medication.

3) Evaluation Phase Outcomes were assessed using the following procedures: Food selection monitoring through weekly review of food purchase records and food consumption, and Blood pressure measurement conducted at baseline and the end of the 12-week intervention.

Ethical considerations

This study was reviewed and approved by the Human Research Ethics Committee of Walailak University (Approval No. WUEC-24-224-01, dated August 2, 2024). Ethical compliance was ensured through the following measures: Participants received detailed information about the study objectives, procedures, and their rights, before written informed consent. All personal identifiers were excluded from the data collection tools to maintain anonymity and confidentiality. Data were stored securely on a password-protected device accessible only to the research team. Study results were reported in aggregate form to ensure participant privacy. All data will be retained for three years after the study and destroyed according to ethical standards.

Data analysis

1) The demographic data were analyzed using frequency, percentage, mean, and standard deviation.

2) Parametric statistics, including independent t-test and paired t-test, were used to compare the mean differences in blood pressure at $p < 0.05$ for all inferential statistical tests.

Results and discussion

Results

Demographic characteristics

Among the 78 participants, 82.1% were male, and 17.9% were female, with a mean age of 46.28 years (SD = 9.29). Most participants (91%) were under 60 and identified as Buddhist (89.7%). The highest education level attained by 44.8% of the sample was primary education. The average duration of incarceration was 3.4 years (SD = 2.69), and 64.1% of inmates had more than two close friends. No statistically significant differences in demographic characteristics between the experimental and control groups were found.

Health status

Regarding BMI, 50.6% of participants were classified as obese, 26% as overweight, and 23.4% had a normal BMI. The majority (67.9%) had systolic blood pressure between 120 - 139 mmHg, and 65.4% had diastolic blood pressure between 80 - 89 mmHg. Most participants (96.2%) had been diagnosed with hypertension for less than 10 years. Additionally, 46.2% had comorbidities, and 46.2% reported rarely or never exercising. There were no significant differences in baseline health between the groups.

Food consumption before the intervention

No significant differences were found between the experimental and control groups in the frequency of consuming high-carbohydrate, high-sodium, and high-fat foods before the intervention ($p > 0.05$). The most commonly consumed foods included bakery items (92.3% in the experimental

group vs. 87.2% in the control group), condiments (51.3% vs. 56.4%), and fried meats (53.8% vs. 51.3%).

Comparison of blood pressure

The experimental group exhibited a statistically significant decrease in systolic and diastolic blood pressure following the intervention. The mean systolic blood pressure decreased from 132.79 mmHg (SD = 9.41) to 123.49 mmHg (SD = 11.08) ($t = 5.382$, $p < 0.05$), and mean diastolic pressure decreased from 86.44 mmHg (SD = 7.76) to 77.23 mmHg (SD = 8.10) ($t = 6.612$, $p < 0.05$) as shown in **Table 1**. Post-intervention comparisons revealed that the experimental group had significantly lower blood pressure levels than the control group. The mean systolic pressure was 123.49 mmHg (SD = 11.08) in the experimental group versus 137.56 mmHg (SD = 14.54) in the control group ($t = 4.81$, $p < 0.05$). Similarly, diastolic pressure was 77.23 mmHg (SD = 8.10) versus 89.87 mmHg (SD = 9.16) ($t = 6.44$, $p < 0.05$), see **Table 2**.

Table 1 Comparison of the mean blood pressure of the experimental group before and after intervention.

Blood pressure	$\bar{x}$	S.D.	t	*p*-value
Systolic			5.38	$< 0.05^*$
Before	132.79	9.41		
After	123.49	11.08		
Diastolic			6.61	$< 0.05^*$
Before	86.44	7.76		
After	77.23	8.10		

$^*p$-value < 0.05.

Table 2 Comparison of the mean blood pressure between the experimental and control groups after intervention.

Blood pressure	$\bar{x}$	S.D.	t	*p*-value
Systolic			4.81	$< 0.05^*$
Experimental	123.49	11.08		
Control	137.56	14.54		
Diastolic			6.44	$< 0.05^*$
Experimental	77.23	8.10		
Control	89.87	9.16		

**p*-value < 0.05.

Discussion

This study demonstrated that a dietary selection promotion program by enhancing inmates' awareness of hypertension risks and reducing barriers through peer support significantly reduced systolic and diastolic blood pressure among incarcerated individuals with hypertension. The findings align with prior studies emphasizing the impact of dietary behavior on hypertension control (Saengthong, 2023; Khongkaew et al., 2022).

Demographic and health profiles

The majority of participants were middle-aged males with low educational attainment, consistent with Department of Corrections statistics (2023) and previous studies on hypertensive populations (Piamsukwilai, 2022; Songthong et al., 2023). High obesity prevalence and poor exercise habits reflect common lifestyle risk factors in incarcerated settings (Boonsiri & Wongsawang, 2022; Sernthaisong, 2024).

Food consumption patterns

Before the intervention, both groups frequently consumed high-carbohydrate, high-sodium, and high-fat foods. Inmates often relied on bakery products, instant seasonings, and fried items—low-cost, high-calorie options standard in prison welfare shops (Department of Corrections, 2022). These dietary patterns have been linked to elevated blood pressure and increased cardiovascular risk (Blood Pressure UK, 2021; Thai Health Promotion Foundation, 2022).

Effectiveness of the intervention

The significant improvement in blood pressure among the experimental group suggests that the Health Belief Model (HBM)-based intervention effectively influenced health behaviors. The program promoted sustained behavioral change by enhancing inmates' awareness of hypertension risks (perceived susceptibility and severity) and reducing barriers through peer support (buddy system). Instructional tools—stroke risk score cards, food exchange models, and picture-based meal planning—supported health literacy and decision-making. These findings are supported by (Chonsin et al., 2017; Piamsukwilai, 2022), who reported improved dietary behavior and blood pressure control following HBM-based interventions. Peer modeling and health personnel follow-up (cues to action) further reinforced behavior change. Similar to studies by (Srimongkol et al., 2017), participants showed enhanced self-efficacy and motivation to adopt healthier food choices. By the end of the program, high-fat and high-sodium food consumption had significantly decreased, replaced by more nutritious alternatives such as boiled eggs, steamed fish, and mixed vegetables.

Implications

These findings highlight the potential of structured, theory-based interventions in correctional settings. Involving inmates in peer-supported programs and providing accessible health education can address lifestyle-related conditions such as hypertension, even within institutional constraints.

Conclusions

This study demonstrated that a structured dietary selection promotion program, based on the Health Belief Model (HBM), significantly reduced systolic and diastolic blood pressure among hypertensive inmates in a district prison in Upper Southern Thailand. The intervention effectively addressed dietary risk factors by enhancing health knowledge, reducing perceived barriers, and promoting self-monitoring and peer support in food choices.

The findings underscore the importance of tailored health education and behavior modification strategies in correctional settings. Prison nurses are vital in guiding inmates toward healthier eating habits and should integrate evidence-based interventions into routine hypertension management. Additionally, correctional facility administrators should support the availability of more nutritious food options in prison welfare shops and implement institutional policies that promote chronic disease prevention and control. Scaling up this intervention across correctional facilities could help mitigate the rising burden of hypertension among incarcerated populations, reduce the need for external referrals, and improve long-term health outcomes.

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