Effect of Online and Offline Self-Management Programs on Blood Pressure Control Among Ordinary Parliamentary Officials of the Secretariat of the House of Representatives with Uncontrolled Hypertension

ผลของโปรแกรมการจัดการตนเองแบบออนไลน์และออฟไลน์ต่อระดับความดันโลหิตของข้าราชการรัฐสภาสามัญประจำสำนักงานเลขาธิการสภาผู้แทนราษฎรที่ควบคุมโรคความดันโลหิตสูงไม่ได้

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Abstract

Uncontrolled hypertension increases the risk of coronary heart disease, stroke, chronic kidney disease, and premature death. A large number of Thai ordinary parliamentary officials suffer from uncontrolled hypertension, often due to a lack of self-awareness and inconsistent health behaviors for hypertension control. Therefore, self-management is needed to help control hypertension. This quasi-experimental study aimed to compare blood pressure levels between civil servants who received online and offline self-management programs. The sample consisted of 50 Thai ordinary parliamentary officials, divided into two groups: 25 who received the online program and 25 who received the offline program. The sample was selected based on inclusion criteria and random assignment to the groups. The research instruments included online and offline self-management programs and a blood pressure monitor. Data analysis was conducted using descriptive statistics and t-tests.

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The results of the study indicated that, after completing the 12-week trial, the group receiving the online program showed a statistically significant difference in the mean systolic and diastolic blood pressure levels compared to the group receiving the offline program, at the 0.05 significance level. Based on the results of this study, nurses can use the online program to promote healthy behaviors that help control hypertension and prevent complications.

Keywords: Self-management, Online program, Blood pressure control

บทคัดย่อ

โรคความดันโลหิตสูงที่ควบคุมไม่ได้มีความเสี่ยงต่อโรคหลอดเลือดหัวใจ โรคหลอดเลือดสมอง โรคไตเรื้อรัง และนำไปสู่การเสียชีวิตก่อนวัยอันควร ข้าราชการรัฐสภาไทยจำนวนมากที่เป็นโรคความดันโลหิตสูงที่ไม่สามารถควบคุมได้ ซึ่งมักมีสาเหตุมาจากการขาดความตระหนักรู้ในตนเองและการปฏิบัติพฤติกรรมสุขภาพที่ไม่สอดคล้องกับการควบคุมความดันโลหิตสูง จำเป็นต้องมีการจัดการตนเองในการควบคุมโรคความดันโลหิตสูง การวิจัยกึ่งทดลองนี้มีวัตถุประสงค์เพื่อเปรียบเทียบระดับความดันโลหิตระหว่างผู้ที่ได้รับโปรแกรมการจัดการตนเองแบบออนไลน์กับแบบออฟไลน์ ตัวอย่างประกอบด้วยข้าราชการรัฐสภาสามัญไทย จำนวน 50 คน แบ่งเป็น 2 กลุ่ม คือ 25 คน ที่ได้รับโปรแกรมออนไลน์ และ 25 คน ที่ได้รับโปรแกรมออฟไลน์ คัดเลือกกลุ่มตัวอย่างตามเกณฑ์คุณสมบัติและจัดเข้ากลุ่มด้วยวิธีการสุ่มอย่างง่าย เครื่องมือวิจัย ได้แก่ โปรแกรมการจัดการตนเองออนไลน์และออฟไลน์ และเครื่องวัดความดันโลหิต การวิเคราะห์ข้อมูลใช้สถิติเชิงพรรณนาและการทดสอบที่

ผลการวิจัยพบว่าภายหลังเสร็จสิ้นการทดลองระยะ 12 สัปดาห์ กลุ่มที่ได้รับโปรแกรมออนไลน์แสดงให้เห็นความแตกต่างอย่างมีนัยสำคัญทางสถิติในค่าเฉลี่ยความต่างของระดับความดันโลหิตซิสโตลิกและระดับความดันโลหิตไดแอสโตลิกเมื่อเปรียบเทียบกับกลุ่มที่ได้รับโปรแกรมออฟไลน์ ที่ระดับนัยสำคัญ .05 จากผลการศึกษานี้พยาบาลสามารถใช้โปรแกรมแบบออนไลน์ในการสร้างพฤติกรรมสุขภาพที่ดีในการควบคุมโรคความดันโลหิตสูงเพื่อป้องกันการเกิดภาวะแทรกซ้อน

คำสำคัญ: การจัดการตนเอง โปรแกรมออนไลน์ การควบคุมความดันโลหิต

Introduction

Hypertension is a major public health problem not only in Thailand but also a global problem, as the number of new and accumulated hypertension patients is increasing every year. [(1)] The number of people with hypertension in Thailand who are more than 15 years old is reported in the Department of Disease Control, Ministry of Public Health of Thailand's 2023 annual report. The data shows that in 2023, there were 15,638.20 hypertensive patients per 100,000 population,

with 1,189.40 new patients per 100,000 population, an increase from the previous year. The data from this report indicates the high mortality from cardiovascular disease associated with hypertension, even if it is unknown how many patients experienced consequences from uncontrolled hypertension. The primary cause of people's inability to control their hypertension is their continued engagement in risky activities. [2] These habits are controllable; while there is no cure for hypertension, they can be managed to avoid problems by making lifestyle changes and adhering to medical recommendations.

Hypertension control involves keeping systolic and diastolic blood pressure levels within normal ranges of no more than 140/90 mmHg. Published guidelines generally recommend that blood pressure be controlled within the normal range through behavioral adjustments, including maintaining a healthy weight, exercising sufficiently, limiting sodium intake, following the Dietary Approaches to Stop Hypertension (DASH) diet, reducing alcohol consumption, and quitting smoking. [3-8] However, the problem found in people with hypertension is that they cannot control their blood pressure levels to be in the normal range, which makes them more likely to have complications from hypertension. Therefore, to control blood pressure, one must be committed to the behaviors mentioned above.

If hypertension is not adequately controlled, it can lead to various physiological complications associated with elevated blood pressure, including arterial atherosclerosis, left ventricular hypertrophy, and microalbuminuria. Moderate to severe chronic kidney disease, asymptomatic peripheral arterial disease, and hypertensive retinopathy—characterized by retinal hemorrhage or papilledema (swelling of the optic disc)—may also occur. Additional complications include retinopathy, blindness, coronary artery disease, heart failure, and kidney failure. [3] Uncontrolled hypertension increases the risk of stroke by four times and the risk of myocardial infarction by two times. [4]

The primary reason hypertensive patients are often unable to control their blood pressure is a lack of awareness about self-care. [5] This lack of awareness often results in inadequate exercise, inconsistent medication adherence, and failure to attend follow-up appointments, all of which contribute to uncontrolled blood pressure. [6] Consequently, patients experience frequent illness, which affects their ability to work and earn income to support their families, leading to financial difficulties and feelings of frustration and despair. Although hypertension cannot be completely cured, it can be effectively managed to prevent complications and reduce mortality rates from related diseases. [3]

A review of the literature related to blood pressure control and hypertension control from previous research found that the concept that is widely used is the self-management concept [9-14], which has many concepts. The results of research utilizing the self-management concept have shown that it can promote self-management behaviors in controlling hypertension, with several studies successfully reducing blood pressure levels. The application of the self-management concept can be categorized into two models: face-to-face and telemedicine. The main challenge of the face-to-face model is the difficulty in follow-up and providing consultations for hypertensive patients. For example, a previous study suggested using self-management concepts to control blood pressure in hypertensive patients. It recommended the use of telemedicine systems, LINE applications, or EMS applications to monitor patients' self-management for sustainability. This is particularly challenging in rural areas where healthcare providers cannot consistently follow up with patients. [14] On the other hand, the telemedicine model may not be suitable for patients who lack access to communication devices.

Telemedicine involves the use of digital technology to overcome the barriers of distance in providing healthcare services. It has the potential to improve clinical management and expand service coverage. The benefits of telemedicine include reducing unnecessary doctor visits, providing timely care, and extending access to underserved communities. It serves as a key mechanism for implementing self-care interventions. Telemedicine consists of (1) Telehealth, (2) Virtual health and care, (3) Store and forward, (4) Interactive services, and (5) Remote client/patient monitoring. Its applications include (1) Teleconsultation, (2) Tele-expertise, (3) Tele-triage, and (4) Guided self-help. [15] The telemedicine model aligns with self-management concept, which emphasizes that to strengthen self-management behaviors, it is essential to track the progress of these behaviors in hypertensive patients to achieve the previously set goals. Telemedicine reduces barriers to adherence in self-management behaviors by allowing for continuous monitoring, advice, and motivation at the convenience of hypertensive patients. Therefore, promoting self-management behaviors to control blood pressure should incorporate communication technology to facilitate easier monitoring and better access for hypertensive patients. [16]

Thai ordinary parliamentary officials are a group of people who are at risk of having hypertension due to the stressful nature of their work and the heavy workload. According to medical check-up data from the Medical Service Division of the Thai Parliament for the years 2020–2022, the number of government officials with hypertension has been increasing annually by 14.55%, 22.78%, and 28.83%, respectively, with the majority still unable to control their blood pressure within the normal range. [17] A review of empirical evidence from the past 1 0 years

regarding hypertension in Thai civil servants found no relevant data, particularly among Thai ordinary parliamentary officials, as no published information was available. Therefore, the researcher conducted interviews with 30 Thai ordinary parliamentary officials with uncontrolled hypertension. The findings revealed that most participants were knowledgeable about hypertension, its complications, and methods for controlling blood pressure. However, they continued to engage in unhealthy behaviors due to the high demands and stress associated with their work in parliament, which hindered their ability to maintain a proper diet, exercise regularly, and manage stress effectively. Some individuals exhibited symptoms of stroke but did not prioritize treatment due to their heavy workloads. This indicates a lack of appropriate hypertension management behaviors, stemming from a mismatch between their work lifestyle and necessary health practices. [18]

Therefore, Thai ordinary parliamentary officials with uncontrolled hypertension lack clear goals for controlling their blood pressure and may have insufficient motivation, making it essential to promote self-management behaviors for hypertension control. The self-management concept and telemedicine align with the work lifestyle and time constraints of Thai ordinary parliamentary officials, who can choose when to access information through online channels, seek consultations, and manage obstacles to performing self-management behaviors for hypertension control at their convenience. This is because they do not need to travel to healthcare facilities and can manage their time independently. All Thai ordinary parliamentary officials have access to smartphones or other digital devices, such as tablets. Fast and informal coordination in parliament often uses LINE groups, which everyone is familiar with and can use effectively. Therefore, the use of digital technology, such as smartphones or tablets, for self-management via the LINE application for hypertension control is highly feasible due to the convenience of accessing information. These technologies are increasingly being used in hypertension management, albeit in different forms.[19-26] Therefore, all stages of activities following the self-management concept will be conducted in an online format. This includes raising awareness and knowledge about high blood pressure and preventing complications from uncontrolled blood pressure, which can be accessed and reviewed at any time without limitations. Self-motivation will be stimulated by setting personal goals recorded in the online system, reporting self-practices through the system, and ensuring continuity in behavioral practices by allowing users to monitor progress through easily interpretable graphs and charts. Additionally, an online administrator will provide continuous consultation to encourage ongoing practices. This online system, called 'Mho Sapa,' aims to compare differences in blood pressure through self-management concepts in an online format versus an offline format. The

efficiency of this online management program can be widely applied in hypertension management, both in preventing the disease and preventing complications from uncontrolled hypertension, as most Thai people today have access to mobile phones, and LINE OA is a commonly used communication application.

Objectives of the research

To compare the effects of online and offline self-management programs on blood pressure among individuals with uncontrolled hypertension who are Thai parliamentary officials at the Secretariat of the House of Representatives, the specific objectives of the study are as follows:

1. To compare blood pressure levels before and after the 12-week trial in the group that received the online self-management program.

2. To compare blood pressure levels after 12 weeks between the online and offline self-management programs.

Research hypothesis

1. The online group's mean blood pressure levels after 12 weeks would be higher than their blood pressure levels before the program.

2. The online group's mean blood pressure levels would be significantly lower than those of the offline group 12 weeks after the program's completion.

Research Conceptual Framework

The self-management concept employed in this study was that of Browder and Shapiro (1985)[16], who defined self-management as the realistic assessment of one's knowledge, skills, and abilities through goal-setting, goal-monitoring, and goal-creation motivation, including self-regulation and feedback-response. It's a process of personal growth or habit modification. Self-management consists of (1) self-assessment of knowledge, skills, and abilities, with knowledge-building if deficiencies are identified. (2) Setting achievable goals to stimulate awareness after knowledge acquisition, leading to behavioral enactment to achieve set goals. (3) Monitoring progress towards goals. (4) Establishing motivation to achieve set goals. (5) Self-regulation and responsiveness to feedback, with steps 3-5 fostering continuous behavioral enactment. The self-management idea proposed by Browder and Shapiro is more concerned with generating social support for behavior change that will lead to changes in health-related behavior.

The self-management behaviors in this study focused on controlling hypertension, including maintaining a healthy weight, exercising sufficiently, limiting sodium intake, following the Dietary Approaches to Stop Hypertension (DASH) diet, reducing alcohol consumption, and quitting smoking. [3-8] However, the application of Browder and Shapiro's self-management concept in this study was integrated with a telemedicine approach, as face-to-face methods may present challenges in follow-ups and consultations, potentially reducing motivation and adherence to self-management behaviors. The telemedicine model aligns with Browder and Shapiro's self-management concept, which emphasizes that to strengthen self-management behaviors, it is essential to track progress in these behaviors to achieve previously set goals. Telemedicine reduces barriers to adherence by allowing for continuous monitoring, advice, and motivation, all at the convenience of hypertensive patients. Both Browder and Shapiro's self-management concept and telemedicine align with the work lifestyle and time constraints of parliamentary officials, who can choose when to access information through online channels, seek consultations, and manage obstacles to performing self-management behaviors for blood pressure control at their convenience. This is because they do not need to travel to healthcare facilities and can manage their time independently. The research framework is illustrated in Figure 1.

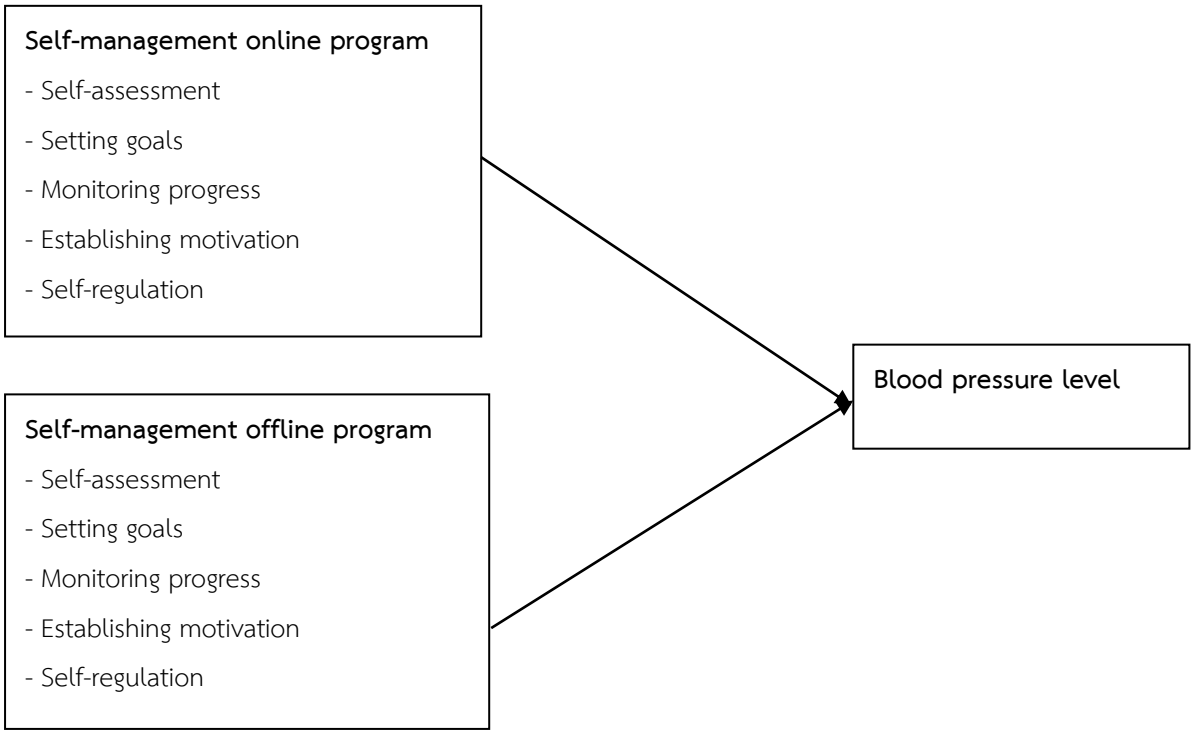

Figure 1: Research conceptual framework

Research Methodology

This study employed a quasi-experimental design, specifically a two-group pretest-posttest design.

Population and Sample: This research was conducted at the Secretariat of the House of Representatives. The population consisted of ordinary parliamentary officials from the Secretariat who had been diagnosed by a physician with uncontrolled hypertension, defined as having a blood pressure higher than 140/90 mmHg for at least one month. This diagnosis was based on the results of the annual health check-up conducted by the Secretariat in 2021. The total number of ordinary parliamentary officials with hypertension was 198. [17]

The sample size was calculated using G*Power 3.1.9.4 to compare two independent proportions, with an effect size of d = 0.80. The α error probability was set at 0.05, with a power (1 - β error probability) of 0.80, and an allocation ratio of N1/N2 = 1. The required sample size was 42 participants (21 per group). To account for potential attrition over the 12 weeks, the sample size was increased by 20%. [27] Therefore, the final sample size was 50 subjects (25 per group). The sample was selected using purposive sampling based on the following inclusion criteria: (1) diagnosed by a physician as unable to control blood pressure below 140/90 mmHg for at least 3 months; (2) aged between 35 and 59 years; (3) possessing a smartphone capable of accessing the LINE application; and (4) willing to participate in and cooperate with all activities throughout the 12-week research program.

The exclusion criteria were: (1) severe complications from hypertension requiring hospitalization during the study period and (2) voluntary withdrawal. A total of 77 individuals met the selection criteria. Fifty subjects were then randomly selected using simple random sampling. Variables were controlled for confounding using a matched-pairs design, considering age, gender, and education level as the matching variables. [27-28] A total of 25 pairs were formed. Subsequently, the sampling allocation was conducted to assign individuals to the online and offline groups using a simple random sampling method, which involved drawing lots.

Research Instruments: The research instruments are divided into those used for conducting the research and those for controlling the experiment, as follows:

1. The research instruments used in the study were divided into online and offline self-management programs. Both interventions followed Browder and Shapiro's self-management framework. [16] The knowledge content about hypertension was the same in both programs, but

the formats differed: the online program provided hypertension knowledge content on the online platform only, while the offline program presented the content in a printed guidebook.

1.1 Self-Management Online Program (Mho Sapa): The researcher developed a 12-week for the experimental group, following the self-management framework by Browder and Shapiro. The program is delivered through the LINE OA platform, focusing on continuous learning via online meetings, virtual classrooms, video media, infographics, and e-books. The experimental group will be supported in acquiring knowledge and skills in self-management by tracking blood pressure levels and promoting appropriate behaviors, including adherence to the DASH diet, regular physical activity, consistent intake of antihypertensive medication, stress management, and the reduction or cessation of alcohol consumption and smoking.

The process of using the self-management online program (Mho Sapa) for 12 weeks is as follows: ***Registration:*** Participants can register via https://liff.line.me/1657040139-qpARPbWW or scan the provided QR code, which will lead to the registration page. Registration requires inputting the national ID card number. ***Confirmation:*** After successful registration, a confirmation screen will appear, prompting participants to enter their name, surname, nickname, affiliation, date of birth, gender, and height. Once identity verification is completed, participants will receive a welcome message via LINE OA, and the screen will display three menu options: Health Record, Record History, and Health Knowledge. ***Health Record Menu:*** Selecting this option will display a screen specifying the date and time of recording, body weight, systolic and diastolic blood pressure levels, and heart rate. After recording, a screen will appear showing the interpretation of blood pressure levels and body mass index. ***Record History Menu:*** Selecting this option will display a screen with personal health history, including personal information, a history of blood pressure recordings, body mass index for each recording, and a report button. Pressing the report button will display a graph of blood pressure levels. ***Health Knowledge Menu:*** Selecting this option will display a screen with information regarding hypertension, methods for preventing complications from uncontrolled hypertension, and other important information. Participants can access this information for review at any time.

1.2 Self-Management Offline Program: The researcher developed an offline self-management program for the comparison group, following the self-management framework by Browder and Shapiro. The program was designed to be conducted in meeting rooms at the Office of the Secretary of the House of Representatives. The researcher provided knowledge through lectures and videos about hypertension, focusing on the dangers of complications, causes,

symptoms, and self-management techniques to control and prevent hypertension-related complications. The program included steps for behavior change to prevent complications, such as adopting the DASH diet, regular physical activity, consistent medication intake, stress management, reducing or avoiding alcohol consumption, and quitting smoking. Participants learned from self-help manuals on hypertension, recorded blood pressure levels, and documented problems and obstacles in controlling hypertension in blood pressure logbooks. The researchers acted as peer learners, exchanging experiences, tracking progress, assessing outcomes, facilitating convenience, and providing continuous support to address self-management challenges.

2. The tool for controlling the experiment was the blood pressure record sheet. The group that received the online self-management program recorded their blood pressure through the LINE OA Application system, while the group that received the offline program used a printed blood pressure record sheet, which included the date, time, systolic blood pressure, and diastolic blood pressure.

Both the research instruments and the tools for controlling the experiment underwent a content validity review of the processes, steps, activities, and evaluations by five experts: one lecturer in behavioral science research, one expert in medicine and public health at the Parliament, one lecturer in community nursing, one lecturer in adult nursing, and one expert in information and digital systems.

Data Collection: The researcher experimented and collected data from July 2022 to January 2023. After obtaining research ethics approval, the researcher met with the Secretary of the House of Representatives to request permission to conduct the experiment and gather data. Upon approval from the Secretary of the House of Representatives, the researcher met with both groups at different times and dates in private meeting rooms, explaining the objectives and detailed activities of the research process. They also clarified participation requirements throughout the project duration. The researcher provided detailed information about participant rights, encouraged questions, and solicited feedback on program participation. In this session, participants were asked to sign an informed consent form.

Table 1 Activity schedule of the online and offline self-management program.

Session	Activities	Online	Offline
1st Weeks **Day 1** (1-2 hrs.)	*Activity 1: My goal*	In the LINE meeting room, researchers introduce themselves, explain program activities, demonstrate the use of the Mho Sapa LINE OA, give participants a chance to share their experiences related to individual self-management, and set mutual goals together.	The researcher explains and introduces the program activities, hypertension guide handbook, blood pressure record book, and other information, and provides a chance for participants to share their individual experiences with self-management methods and create goals.
Day 2 (2 hrs.)	*Activity 2: Management learning*	On the LINE Meeting Room: - The researcher shows a video presentation titled "Hypertension" and then provides knowledge on hypertension control through lectures accompanied by slideshow presentations. - The researcher explains and demonstrates methods for hypertension control in six aspects: diet, physical activity, medication, stress, alcohol, and smoking. - Participants analyze their behaviors together with the researcher, who suggests personalized practices for each individual.	The activities are similar to those of an online self-management group, but they differ in that they are conducted in a parliamentary meeting room.
Day 3-7	*Activity 3: Self-learning* .	Individual participants learn about hypertension control through their LINE OA Mho Sapa under the 'Health Education Learning Room' menu.	Individual participants learn about hypertension control from their own hypertension guide handbook.

Table 1 Activity schedule of the online and offline self-management program. (continue)

Session	Activities	Online	Offline
2nd Week **Day 1** **(2 hrs.)**	*Activity 4: Self-review*	In the LINE Meeting Room: - The researcher reviews knowledge of self-management in six aspects. - The researcher and participants establish a mutual agreement on self-awareness to adopt self-management behaviors.	The activities are similar to those of an online self-management group, with the main difference being that they are conducted in a parliamentary meeting room.
Day 2-7	*Activity 5: Self-learning*	Individual participants learn about hypertension control through their LINE OA Mho Sapa, under the 'Health Education Learning Room' menu.	Individual participants learn about hypertension control from their own hypertension guide handbook.
3-12 Weeks 1st Day of every week (30 min per person)	*Activity 6: Self-reflection*	In the LINE Meeting Room: - The researcher provides individualized consultation to participants on self-management, offers assistance in case of problems or obstacles, and supports continuous behavioral engagement. - The researcher encourages participants to report their progress in self-management. Participants use LINE OA Mho Sapa to report their behaviors and progress in self-management.	In the private room: - The researcher provides individualized consultation to participants on self-management, offers assistance in case of problems or obstacles, and supports maintaining continuous behavioral practices. - The researcher encourages participants to record their progress in self-management activities in the BP record book.

Table 1 Activity schedule of the online and offline self-management program. (continue)

Session	Activities	Online	Offline
Day 2-6	*Activity 8: Self-management*.	- Participants join and use LINE OA Mho Sapa to report their behaviors and progress in self-management. - The researcher encourages participants to review the interpretation of their reported results through the LINE Meeting.	Participants engage in self-directed self-management activities.
Day 7	*Activity 7: Motivation and goal*	The researcher creates motivation by publicly acknowledging and praising participants who effectively manage themselves through the LINE Meeting.	- Participants submit their BP record books to the researcher for analysis and interpretation of self-management progress. - The researcher commends and applauds participants who show good progress in self-management on the information board at the Medical Service Department.
Last day of week 12 **Post-test** **5th visit** (After 12 weeks of implementation of the program) 2 hrs.	Evaluate self-management and blood pressure control.	In the LINE Meeting Room: - The researcher collaborates with the group of participants to summarize the results of self-management over the 12 weeks. - The researcher admires all participants with good self-management behaviors. - Blood pressure record. - The program concludes.	In the private room: - The researcher summarizes the results of self-management over the 12 weeks with the participant group. - The researcher commends all participants with good self-management behaviors. - Blood pressure record. - The program concludes.

Both online and offline self-management programs were conducted simultaneously. To prevent contamination between the two participant groups, the online group used the LINE application, which was restricted to access via national ID and required approval from the administrator (the researcher) to use the online self-management program.

Data Analysis: Personal data were analyzed using statistical methods to calculate frequency, percentage, mean, and standard deviation. The analysis of differences within groups was conducted using a paired t-test, while the analysis of differences in mean scores between the online and offline groups was performed using an independent t-test. The inferential statistics were based on the assumption test conditions for using t-statistics (e.g., normality testing).

Research Ethics and Protection of Rights: The study was approved by the Institutional Review Board of Huachiew Chalermprakiat University (IRB No. 1220/2022). The researcher explained the research project and informed the participants that they could freely decide whether they would like to participate in it and could withdraw at any time. The data obtained would be kept confidential. The results of the study would be presented as a group rather than individual data; if the participants were willing to participate in the study, they signed informed consent before the study. The participants had to demonstrate their willingness to participate throughout the study.

Research Results

Characteristics of participants

The total sample consisted of 50 participants, divided into two groups: an online group with 25 participants and an offline group with 25 participants, all of whom completed the study. The majority were female, with an average age of 45.36 years. Most participants were diagnosed with obesity, with a body mass index ranging from 25.00 to 25.99 kg/m². All had completed a master's degree, and the duration of their hypertension diagnosis was either 1-3 years or 4-6 years, with similar proportions in each group. A comparison of key personal data between the two groups—such as gender, age, body weight, height, waist circumference, body mass index, education level, hypertension duration, other underlying diseases, and medical follow-up—showed no significant differences. Personal data was matched to control for confounding variables, including gender, age, and education level, in both the online and offline groups. As shown in Table 2.

Table 2 Participants' characteristics

Characteristics	Online (n= 25)	Offline (n= 25)	Statistic value	p-value
Gender, Frequency (%)			0 [a]	1.000
Female	13 (52.00)	13 (52.00)		
Male	12 (48.00)	12 (48.00)		
Age (years), Mean (SD)	46.14 (5.52)	44.59(6.65)	-0.838 [t]	.407
BMI (kg/m^2), Mean (SD)	26.71 (2.64)	27.12 (4.61)	0.363 [t]	.719
Education level, Frequency (%)			0 [a]	1.000
Bachelor degree	9 (18.00)	9 (18.00)		
Master's degree	16 (64.00)	16 (64.00)		
Hypertension period			0.608 [b]	.895
Medical follow-up, Frequency (%)			0.101 [a]	.500
Regular	8 (32.00)	7 (28.00)		
Loss follow-up ≥ 1 time	17 (68.00)	18 (72.00)		

t = t-test, [a] = Chi-square test, [b] = Fisher' Exact test

Table 3 shows that in the group that received the online program, at 12 weeks, the mean systolic blood pressure and mean diastolic blood pressure were significantly lower than before receiving the online program, with a statistical significance level of 0.05. Table 4 shows that in the group that received the offline program, at 12 weeks, the mean systolic blood pressure and mean diastolic blood pressure did not differ from before receiving the offline program.

Table 3 Comparison of mean systolic and diastolic blood pressure before and after receiving the 12-week program of the online group.

Variables	Pre-test (n = 25)		Post-test (n = 25)		t	p-value
	M	SD	M	SD		
Systolic BP	153.81	8.94	140.18	10.18	6.941	< .001
Diastolic BP	96.86	5.84	86.22	9.40	4.916	< .001

Table 4 shows that before receiving the program, there was no significant difference in the mean systolic or diastolic blood pressure between the online program group and the offline program group. After both groups participated in the program for 12 weeks, the online program group had significantly lower mean systolic and diastolic blood pressure compared the offline program group. To control for the initial differences in mean blood pressure between the two groups, Table 5 demonstrates that the mean differences in systolic and diastolic blood pressure

were significantly lower in the online program group than in the offline program group at the .05 level.

Table 4 Comparison of mean systolic and mean diastolic blood pressure before and after receiving the 12-week program between the online and offline groups.

Variables	Online Group (n = 25)		Offline Group (n = 25)		t	p-value
	M	SD	M	SD		
Systolic BP (Pre-test)	153.81	8.94	154.68	10.18	-.299	.767
Diastolic BP (Pre-test)	96.86	5.84	99.72	7.04	-1.468	.150
Systolic BP (Post-test)	140.18	8.56	154.90	10.34	-5.143	< .001
Diastolic BP (Post-test)	86.22	9.40	97.50	5.98	-4.743	< .001

Table 5 Comparison of mean differences in systolic and diastolic blood pressure before and after receiving the 12-week program between the online and offline groups.

Variables	Online Group (n = 25)		Offline Group (n = 25)		t	p-value
	$\overline{D}$	$\overline{S_D}$	$\overline{D}$	$\overline{S_D}$		
Systolic BP	13.63	9.21	-.22	10.87	4.563	< .001
Diastolic BP	10.63	10.14	2.22	10.16	2.745	.009

Conclusion and Discussion of Results

This study shows that the online self-management program is more effective than the offline self-management program in reducing systolic and diastolic blood pressure over 12 weeks. Although both programs apply the self-management concept of Broder and Shapiro [16], which includes self-monitoring, self-evaluation, self-recording, and self-reinforcement strategies to drive program activities and support participants in developing self-management behaviors to ultimately control their blood pressure, the study found that before the 12-week intervention period, there was no statistically significant difference in the mean systolic and diastolic blood pressure between the comparison group and the experimental group at the 0.05 significance level. However, after the 12-week intervention, the experimental group showed a statistically significant reduction in mean systolic and diastolic blood pressure at the .05 level.

This difference is believed to be due to the variation in how program activities were delivered based on the four self-management components. In the offline group, although self-management concepts were applied, the program activities were delivered through scheduled face-to-face meetings, which may have caused inconvenience for participants in adhering to the program and limited the frequency of researcher follow-ups. This aligns with previous studies indicating that self-management approaches for controlling blood pressure in patients with

uncontrolled hypertension should integrate telemedicine, Line Application, or EMS Application to ensure sustained self-management, especially in remote areas where healthcare providers cannot consistently follow up with patients. [14]

For the online group, where program activities were delivered online through the Line OA system, participants found it more convenient to engage in activities and could integrate them more seamlessly into their lifestyle and work routines. This can be explained by the World Health Organization's telemedicine concept [15], which facilitates healthcare service delivery across distances. Healthcare professionals use information and communication technology to exchange accurate data for diagnosis, treatment, and disease prevention. The core principles of telemedicine include remote healthcare services through digital tools, remote data storage and forwarding (store and forward), interactive services, remote client/patient monitoring, and guided self-help. These services can be delivered through smartphones, websites, or books, with healthcare professionals providing support via phone or online platforms. Therefore, even though the self-management concept is applied in both cases, if it does not align with an individual's lifestyle, it may not be effective enough for controlling high blood pressure.

Therefore, applying this concept to drive a self-management program for developing healthy behaviors can effectively lower blood pressure. This aligns with previous studies that have used telemedicine for hypertension self-management in individuals with hypertension. For example, mobile apps demonstrated greater efficacy in promoting self-management behaviors for hypertension management compared to control groups. [30] WeChat for self-management among hypertensive patients resulted in higher self-management behaviors than in control groups. [31] A systematic review on the effectiveness of mobile applications for hypertension monitoring in adults found improvements in self-management behaviors, treatment motivation, and adherence. [32] Using the Green Heart Smartphone application, hypertensive patients achieved greater blood pressure control after six months compared to those receiving usual care. [33] Additionally, multi-modal digital management through WeChat led to a significant reduction in mean blood pressure after six months. [34] The use of mobile health (mHealth) technology to support hypertensive patients in improving self-management behaviors. Moreover, interactive app-enabled mHealth solutions have been shown to help hypertensive participants reduce their blood pressure. [20] mHealth technology for hypertension management in community-based adults empowered participants, improved patient-provider communication without the burden of clinic visits, and increased engagement in blood pressure control. [35] Chatbots for hypertension self-management support may further enhance the self-management experience. [36] Furthermore, digital health

programs for blood pressure control have been shown to result in significant reductions in mean blood pressure after 12 months in individuals with previously uncontrolled hypertension. [37] The use of mHealth interventions for hypertension management has also been associated with successful blood pressure control after six months. [38] Similarly, digital health apps have demonstrated greater improvements in blood pressure control after 12 weeks. [26]

This study has a limitation in that it could not strictly prevent contamination between the participants in the online and offline program groups, as parliamentary officials work in the same area. However, contamination was controlled by matching the samples based on gender, age, and education level, as well as restricting access to the online program, which required approval from the administrator or researcher.

Research Suggestions

Suggestions for applying the research results: The results of this study demonstrate the effectiveness of the online self-management program in reducing blood pressure, owing to its ease of use and accessibility. The user base for this online program should be expanded to include all parliamentary officials with uncontrolled hypertension, as well as community nurses working in primary healthcare facilities or other service centers responsible for caring for patients with hypertension. These healthcare professionals can recommend the online program through the LINE OA system to help prevent hypertension and its complications in those with uncontrolled hypertension.

Suggestions for future research: In the next study, the self-management online program should be developed to address other non-communicable chronic diseases such as metabolic syndrome, diabetes, and cardiovascular disease. It should also be made more user-friendly. For example, AI technology could be utilized to automatically record users' health data, eliminating the need for manual input and reducing potential errors in data entry. Additionally, the effectiveness of the online program should be tested through a randomized controlled trial (RCT). Based on the results of this study, although the online program reduced blood pressure more effectively than the offline program, systolic and diastolic blood pressure values remained close to 140/90 mmHg. Therefore, the program duration should be extended.

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