# EFFECTS OF SELF-MANAGEMENT PROMOTION PROGRAM ON BLOOD PRESSURE AND BODY MASS INDEX IN PERSONS WITH PREHYPERTENSION AND OBESITY

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A Dissertation Submitted in Partial Fulfillment of the Requirements
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# ผลของโปรแกรมส่งเสริมการจัดการตนเองต่อระดับความดันโลหิตและดัชนีมวลกาย ของผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน

นางสาวธิดา ทองวิเชียร



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาพยาบาลศาสตรดุษฎีบัณฑิต
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| Thesis Title | EFFECTS OF SELF-MANAGEMENT PROMOTION PROGRAM ON BLOOD PRESSURE AND BODY MASS INDEX IN PERSONS WITH PREHYPERTENSION AND OBESITY |
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ธิดา ทองวิเชียร : ผลของโปรแกรมส่งเสริมการจัดการตนเองต่อระดับความดันโลหิตและดัชนีมวลกายของผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน (EFFECTS OF SELF-MANAGEMENT PROMOTION PROGRAM ON BLOOD PRESSURE AND BODY MASS INDEX IN PERSONS WITH PREHYPERTENSION AND OBESITY) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: รศ. ร.ต.อ.หญิง ดร. ยุพิน อังสุโรจน์, อ.ที่ปรึกษาวิทยานิพนธ์ร่วม: ผศ. ดร.สุนิดา ปรีชาวงษ์, 169 หน้า.

การวิจัยครั้งนี้มีวัตถุประสงค์ เพื่อศึกษาผลของโปรแกรมส่งเสริมการจัดการตนเองต่อระดับความดันโลหิตและดัชนีมวลกายของผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน การวิจัยนี้ใช้รูปแบบการทดลองที่มีกลุ่มควบคุมและการทดสอบก่อนและหลัง กลุ่มตัวอย่าง คือ ผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน จำนวน 66 คน แบ่งเป็นกลุ่มทดลองและกลุ่มควบคุมด้วยวิธีการจับฉลาก จำนวนกลุ่มละ 33 คน กลุ่มทดลองเข้าร่วมในโปรแกรมส่งเสริมการจัดการตนเองและการดูแลตามปกติ ขณะที่กลุ่มควบคุมได้รับการดูแลตามปกติ โปรแกรมส่งเสริมการจัดการตนเองมุ่งเน้นการส่งเสริมให้ผู้เข้าร่วมโปรแกรมมีความรู้ ความสามารถในการจัดการพฤติกรรมสุขภาพเพื่อลดปัจจัยเสี่ยงของโรคความดันโลหิตสูง ได้แก่ การรับประทานอาหารและการออกกำลังกายที่ไม่เหมาะสม โปรแกรมนี้แบ่งออกเป็น 3 ระยะ ได้แก่ 1) ระยะการประเมินปัญหาและสร้างแรงจูงใจ 2) ระยะฝึกทักษะการจัดการตนเอง และ 3) ระยะติดตามกำกับการจัดการตนเอง กลุ่มทดลองและกลุ่มควบคุมได้รับการประเมินระดับความดันโลหิตและดัชนีมวลกายก่อนเข้าร่วมโปรแกรม และในสัปดาห์ที่ 12 การวิเคราะห์ข้อมูลใช้สถิติ Independent t-test และ Paired t-test

ผลการศึกษาพบว่า กลุ่มทดลองมีระดับความดันโลหิตซิสโตลิกและไดแอสโตลิกลดลงมากกว่ากลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติ ($p<.05$) และกลุ่มทดลองมีระดับความดันโลหิตซิสโตลิก ไดแอสโตลิก และดัชนีมวลกายลดลงภายหลังเข้าร่วมโปรแกรมอย่างมีนัยสำคัญทางสถิติ ($p<.05$) ผลการศึกษาบ่งชี้ว่าโปรแกรมส่งเสริมการจัดการตนเอง เป็นโปรแกรมทางการพยาบาลที่ช่วยลดระดับความดันโลหิตซิสโตลิก ไดแอสโตลิก และดัชนีมวลกายได้



สาขาวิชา พยาบาลศาสตร์ ลายมือชื่อนิสิต .....

ปีการศึกษา 2559 ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

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THIDA TONGVICHEAN: EFFECTS OF SELF-MANAGEMENT PROMOTION PROGRAM ON BLOOD PRESSURE AND BODY MASS INDEX IN PERSONS WITH PREHYPERTENSION AND OBESITY. ADVISOR: ASSOC.PROF. POL.CAPT. YUPIN AUNGSUROCH, Ph.D., CO-ADVISOR: ASST.PROF. SUNIDA PREECHAWONG, Ph.D., 169 pp.

The purpose of this study was to examine effect of the Self-Management Promotion Program (SMPP) on blood pressure and body mass index of persons with prehypertension and obesity. This study applied a two-group quasi-experimental with pretest and posttest design. Sixty-six persons with prehypertension and obesity were randomly assigned to either the experimental or control group by using drawing lots, consisting of 33 participants in each group. The participants in the experimental group participated in the SMPP and conventional care, while those in the control group received the conventional care. The SMPP was designed to enhance knowledge and promote management of health behaviors in participants to reduce risk factors of hypertension including poor eating and lack of exercise. The SMPP comprised three phases: 1) health assessment and motivation, 2) self-management skill training, and 3) self-management practice monitoring. The participants in the experimental and control groups were assessed blood pressure and body mass index at baseline and the $12^{th}$ week. Data was analyzed using the independent t-test and the paired t-test.

The findings revealed that the participants in the experiment group had lower systolic and diastolic blood pressure than those in the control group ($p<.05$). In addition, after participating in the SMPP, systolic blood pressure, diastolic blood pressure, and body mass index in the experimental group were significantly lower than before participating in the SMPP. These findings indicated that the SMPP was an effective nursing intervention to reduce systolic blood pressure, diastolic blood pressure, and body mass index for persons with prehypertension and obesity.

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Student's Signature .....
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# CHAPTER I

# INTRODUCTION

## Background and significance of the study

Prehypertension, which is systolic blood pressure (SBP) in range of 120-139 mmHg or a diastolic blood pressure (DBP) in range of 80-89 mmHg (Chobanian et al, 2003), is a major public health concern. Prevalence of prehypertension in worldwide is 38% (Guo et al, 2012). In Thailand, prevalence of prehypertension is 14.7 people (32.8%) (Aekplakorn et al., 2008). Prehypertension is significantly associated with obesity in adults (Jang et al., Wakabayashi, 2012). Obesity, which is abnormal or excessive fat accumulation, impairs health. Body mass index (BMI) is the most widely used to identify obese individuals. BMI is equal to or greater than 25 $kg/m^2$ as obesity (World Health Organization, 2000). The epidemiologic studies of prehypertension have demonstrated that the prevalence of prehypertension and in combination with obesity are 30%-70% in adults both western society and Thailand (Booth et al., 2017; Dua et al., 2014; Rasamejam, Akaratanapol, & Durongritichai, 2013; Tremongkontip et al., 2012; Xu et al., 2016).

Both prehypertension and obesity have increased risk of developing hypertension (Guo et al., 2011; Landsberg et al., 2013). In addition, meta-analysis and cohort studies have suggested that both conditions have associated with cardiovascular disease and stroke (Chen et al., 2013; Huang et al., 2013; Lee et al., 2011). Risk of incident hypertension is higher in persons with prehypertension compared with normotensive persons by 4-fold to 12-fold while those with obesity have increased risk of progression to hypertension more than 3-fold (Ferguson et al., 2010). In addition, persons with prehypertension and obesity have a strong relationship to metabolic risk factors as a pathway for accelerated cardiovascular disease (Gupta, Brashear, & Johnson, 2011). This information has showed that persons with prehypertension and obesity seem to have high adverse consequences. Therefore, prevention of progression to hypertension by reducing blood pressure and BMI in this group is necessary to reduce occurrence risk of severe consequences.

Lifestyle modification is recommended to reduce blood pressure and BMI in persons with prehypertension and obesity. It composes of weight reduction, Dietary Approaches to Stop Hypertension (DASH) eating plan, dietary sodium reduction, moderation of alcohol consumption, physical activity, and regular exercise (Chobanian et al., 2003). The components of lifestyle modification emphasize healthy diet eating and exercise. For healthy diet, there is a significant reduction in both blood pressure and BMI. Reducing dietary sodium intake can lower blood pressure between 2-8 mmHg. DASH dietary pattern composes of consuming a diet rich in fruits, vegetables, and low fat dairy products with a reduced content of saturated and total fat reduce SBP by 5.5 mmHg and DBP by 3.0 mmHg. Moreover, losing weight 10 kg can reduce blood pressure about 5-20 mmHg (Chobanian et al., 2003), and weight loss of 5–10% is associated with reduction in blood pressure of 10 mmHg and a reduction in risk factors for cardiovascular disease (Kopelman, Caterson, & Dietz, 2009). Healthy diet eating is benefit for persons with prehypertension and obesity to reduce their blood pressure and BMI.

For exercise or physical activity, it plays an important role in the reduce blood pressure (Lip, 2007), and BMI (SIGN, 2010). Persons who have performed activity in leisure time as exercise have 34% lower odds of developing high blood pressure compared with those who are least active (Lin & Svetkey, 2012). Evidence of the randomized control trial study has also supported the role of exercise in lowering blood pressure. Systematic review regarding the effect of aerobic exercise on blood pressure has showed that aerobic exercise associated with a significant reduction in mean SBP and DBP (Punia et al., 2016). Moreover, clinical practice guideline has recommended that exercise can reduce both blood pressure and BMI in people who is overweight or obesity (SIGN, 2010).

A meta-analysis examining the effect of brisk walking intervention programs on blood pressure has concluded that brisk walking could lower both blood pressure and BMI. The findings have showed that participants in the walking program can decrease in BMI ranging from 0.2 to 2.0 $kg/m^2$, and it is a relative reduction of 3.4% in blood pressure (Murphy et al., 2007). Brisk walking is recommended as strategies to

reduce blood pressure and BMI in the guideline on the treatment of high blood pressure in western and Thailand (Chobanian et al., 2003; SIGN, 2010; Thai Hypertension Society, 2015). Brisk walking is a low cost and low risk exercise that most people can undertake (Mutrie & Hannah, 2004). Increasing the amount of walking among persons who have undertaken in their daily routines might be a simple way to promote exercise and improve blood pressure and BMI. Thus, brisk walking exercise is considered as strategy for persons with prehypertension and obesity to decrease blood pressure and BMI.

Although, healthy diet eating and exercise are benefit to reduce both blood pressure and BMI, there are numerous persons tend to not engaging in the lifestyle modification (Akeplakorn, 2008; Greenlund, Daviglus, & Croft, 2009). Persons with prehypertension and obesity is stated that persons with prehypertension who have BMI higher than normal level. High BMI results from an energy imbalance between energy intake and energy expenditure. It relates to eating too much and lack of exercise (Ted, Bray, Temple, & Struble, 2010). From previous studies, Boeckner et al. (2007) studied eating behaviors in midlife to older women. More than half of the participants were prehypertension and obesity. The findings showed that participants had energy intakes in excess of energy requirement including calories from fat while eating fruits, grains, and dietary fibers were below target levels. Consistently, current study in Thailand revealed that this population was eating salt diet, high fat diet, and low exercise (Rasamejam et al., 2013; Saengdet & Limtragool, 2012; Tremongkontip et al., 2012). This data has showed that inappropriate eating and exercise behaviors should be concerned in this population.

Reasons for not engaging in healthy diet eating and exercise, hypertension awareness in persons, who are labeled as prehypertension, is alarmingly poor (Badakhsh et al., 2015). Label of prehypertension has seemed to exert no negative effect on people's perception of their health (Viera, Lingley, & Esserman, 2010). In addition, individual's responses have differed depending on understanding of the disease and explaining in terms of the visibility or invisibility of disease (Muttico et al., 2010). High blood pressure has no warning signs and symptoms. This point may lead

people not engage in lifestyle modification and not come back for a follow-up their blood pressure at health center (Hernandez & Anderson, 2012). Persons in this group also have an inappropriate self-practice in prevention of disease (Dheengarm, Tiautchasuwan, & Boromtanarat, 2012). Thus, the hypertension prevention program focused on increasing awareness is essential (Badakhsh et al., 2015; Boonyasopun, Perngmark, & Thongtamlung; 2011).

In Thailand, the primary care unit (PCU), which is the first level of health care system, delivers mostly preventive and health promotion services for people in catchment area. These services are provided by community health nurse, who is a key person in PCU. Persons with prehypertension and obesity are defined as persons being a high risk of hypertension, but not patients. Therefore, pharmacological treatment is not recommended, but lifestyle modification is recommended for this population (Chobanian et al, 2003).

In 2013, the Policy of Ministry of Public Health (MOPH) has mentioned the Surveillance, Control, and Preventions System to reduce hypertension which is primary screening of hypertension by using seven color balls to classify levels of hypertensions. Persons with prehypertension and obesity are provided nursing care service through mass health education about hypertension and lifestyle modification including eating, exercise, emotion, and reducing smoking and drinking. (Health Education Division, 2013). Even though, this service is provided in this population, the prevalence and new cases of hypertension in Thailand are still high and likely continue to be increase. Prehypertension is precursor of hypertension (Aekplakorn, 2014); thus, promoting this population to engage in healthy diet eating and exercise is a challenge for community health nurse.

Based on the literature review regarding the existing intervention for persons with prehypertension and obesity in Thailand, the most studies focused on persons with prehypertension or obesity, but not specific in persons with prehypertension and obesity (Wongsombat & Preechawong, 2010; Poosalee & Preechawong, 2014; Thiangtham et. al., 2010; Wattankul et al., 2013). Other studies focused on behavior change of the participants (Saengdet & Limtragool, 2012; Tremongkontip et al., 2012).

Although hypertension awareness is known as an important point, information about concerning of participant's awareness is not provided. Therefore, hypertension prevention program has focused on increasing awareness of the participants should be concerned (Badakhsh et al., 2015).

Furthermore, self-management is interested to support the management of participants with long-term conditions to care for their condition and to prevent further illness emphasizing changes in behaviors through social support, resource, goal setting, knowledge enhancement, decision making, solving problem, and working effectively with health professionals (Kanfer & Gaelick-Buys, 1991; Panagioti et al., 2014). Self-management builds on the basis of self-awareness and is the ability to control by oneself. It may make a different from traditional health promotion or education program by applying knowledge and self-management skills to oneself appropriately (Lorig, 1993).

Self-management is a significant method for maintaining and improving both health behavior and health status (Dongbo et al., 2003). It is consistent with goal of treatment in persons with prehypertension and obesity. The goal is to prevent the progression to hypertension by using lifestyle modification involving behavior change (Chobanian et al, 2003). Applying self-management to reduce blood pressure and BMI, previous studies have supported that SMPP is effective to change behaviors and lower both blood pressure and BMI in various population including obesity, hypertension, or prehypertension (Lee, et al., 2011; Thutsaringkarnsakul, 2011; Wattanakul et al., 2012). However, previous programs are not designed for persons who have prehypertension combined with obesity. They have needed more specific education both diet eating and exercise. Moreover, previous studies have examined the effect of the program on blood pressure or BMI, but they have not focused on both blood pressure and BMI (Thutsaringkarnsakul, 2011; Wattanakul et al., 2012). In addition, various strategies are used in each program; for example, booklet, telephone calls (Thutsaringkarnsakul, 2011), group discussion, home visit by health volunteers (Wattanakul et al., 2012).

In this study, self-management was applied to guide the program development for reducing blood pressure and BMI for persons with prehypertension and obesity in order to reduce blood pressure and BMI through group discussion, telephone call, and home visit. It was expected that persons with prehypertension and obesity who participate in program can reduce blood pressure and BMI better than participants who receive only the conventional care.

**Research question**

Does the self-management promotion program improve blood pressure and body mass index in persons with prehypertension and obesity?

**Research objective**

The objective of this study was to determine effects of self-management promotion program on blood pressure both systolic blood pressure and diastolic blood pressure, and body mass index (BMI) in persons with prehypertension and obesity.

**Theoretical Framework**

Self-management refers to the performance of preventive or therapeutic health care activities (Tobin et al., 1986), and emphasizes the importance of client's responsibility. The acceptance of responsibility in treatment requires that client develop a strong motivation to change behaviors. Self-management allows participants to make informed choices, to adopt new perspectives and generic skills that can be applied to new problems as they arise, and to practice new health behaviors. The results of changing health behaviors are associated with improvement in health behaviors and health status (Ferrans et al., 2005).

Self-management is defined as learning and practicing the necessary skills to change behaviors (Browder and Shapiro, 1985), and it is a dynamic, interactive, and daily process in which individuals engage to manage a chronic illness (Lorig & Holman, 2003). Self-management is designed to help the client to accept the necessity for change and to develop a clear objective for treatment through collaboration with health care provider (Holroyd and Creer, 1986; Kanfer & Gaelick-

Buys, 1991). The relationship between health care provider and client is active a collaborative care. Health care provider plays a crucial role in providing the most favorable conditions for change to clients (Kanfer & Gaelick-Buys, 1991). The client sets their goals about behavioral changes; identifies their risk behaviors problems; and gains understanding and confidence to accomplish their new health behaviors through help from health care provider. Self-management is recognized as a necessary method for maintaining and improving patient's health behavior and health status (Dongbo et al., 2003, Ferrans et al., 2005). Self-management model of Kanfer and Gaelick-Buys (1991) includes three stages as follows:

Self-monitoring stage involves deliberately attending to one's own behavior and past experience to increase client motivation for behavior change. Self-monitoring is the observation of one's own behavior by recording their observations, and analyzing their data to make decisions regarding how to improve one's performance (Bruhn, McDaniel, & Kreigh, 2015). This is a way to build a client's awareness of behavior needing change.

Self-evaluation stage consisted of a comparison between the obtained information from self-monitoring and standard behavior to evaluate whether behaviors should be maintained or discontinued. It involves a comparison between what one is doing and what one ought to be doing, and noting any discrepancy between the two. The perception of discrepancy may trigger efforts to change behavior.

Self-reinforcement stage is described as the person reacts cognitively and emotionally to results of self-evaluation. These reactions have both positive and negative reactions that affect the client's expectations and behavior on future occasions. Negative reaction inhibits the behaviors while positive reaction motivates for the continuation of behaviors management.

Clark et al. (1991) suggests that the successful self-management requires that individuals master with three separates but relates categories of activities. First, they must have sufficiently knowledgeable about their condition and its treatments to

make decisions about care. Second, they must perform activities aimed at management of the condition. Finally, they must apply skills necessary for maintaining adequate physical-psychological-social functioning. Therefore, giving information to increase participant's knowledge and skills are needed and are included in the SMPP.

In this study, the self-management promotion program is developed based on self-management model (Kanfer and Gaelick-Buys, 1991) that provides participants with essential components and is accompanied by mutual activities for participants and nurse. This program provided the knowledge and practice skills for persons with prehypertension and obesity in order to manage their risk behaviors by using self-monitoring, self-evaluation, and self-reinforcement for lowering blood pressure and body mass index.

**Research hypotheses and Rational**

According to Kanfer and Goelick-Buy (1991), self-management is method that clients use to change their behavior through process including self-monitoring, self-evaluation, and self-reinforcement. Self-management can help persons with prehypertension and obesity to change their risk behaviors to the desired behaviors. This is their responsibility leading to reduce blood pressure and BMI (Thoolen et al., 2007). The self-management promotion program is nursing intervention to promote persons with prehypertension and obesity to change eating and exercise behaviors. Behavioral change results in reduction of blood pressure and BMI (Thoolen et al., 2007). This program provides essential knowledge and self-management skills for participants to manage their behaviors. Knowledge involves hypertension, healthy diet eating and exercise.

Self-management skills include self-monitoring, self-evaluation, and self-reinforcement. The participant's behaviors are observed through self-monitoring, which involves deliberately attending to their own behaviors (Kanfer & Gaelick-Buys, 1991). The obtained data of observation is used to provide estimates of behavior or to monitor relative change in behavior over time. Self-monitoring is an effective tool

for behavior change. Its purposes are to increase awareness and monitoring progress (American College of Sports Medicine, 2013). Self-monitoring can effect on behavioral change by reducing undesirable behaviors and increasing target behaviors. On the basis of past experience, participants have built up expectations about acceptable behavior as goal.

Self-evaluation is a comparison between the information obtained from self-monitoring and the standard behaviors. Standard behaviors regarding eating and exercise behaviors are provided through giving knowledge and practice regarding healthy diet eating and exercise to reduce blood pressure and BMI. If they detect a discrepancy between their behaviors and standard behaviors, they tend to change their own behaviors.

The last process is self-reinforcement. Participants react cognitively and emotionally to the results of the self-evaluation. The reactions have feedback effects influencing the strength of the preceding behavior, and they have effects influencing the participant's expectation and behavior on future occasions.

The significant goal of self-management promotion program for persons with prehypertension and obesity is to motivate for hypertension awareness, behavioral change; and to enhance the belief that one can perform effective self-management skills to reduce blood pressure and BMI.

Hypothesis of this study are as follows:

1. The participants in the experimental group had lower SBP, DBP, and BMI than participants in the control group after completion of the program.

2. After participating in the self-management promotion program, the participants in the experimental group had lower blood pressure and BMI than before participating in the program.

**Scope of the Study**

This quasi-experimental study aimed to examine the effect of the SMPP on blood pressure and BMI in persons with prehypertension and obesity. It was conducted at Mahasawat and Klongyong 1 PCUs, Phuttamonthon, Nakhonpathom province. The control group received the conventional care whereas the experimental group received the SMPP and the conventional care. The independent variable was the self-management promotion program and the dependent variable was blood pressure and BMI.

**Operational Definition**

**Blood pressure** refers to two value of pressure in the arteries including highest value during ventricular contraction as systolic blood pressure and lowest value during ventricular relaxation as diastolic blood pressure measured by an automated sphygmomanometer measuring device in millimeters of mercury (mmHg).

**Body mass index** refers to a number of body fat calculated by the weight in kilograms divided by the square of the height in meters ($kg/m^2$).

**Person with prehypertension and obesity** refers to person at risk for hypertension who has blood pressure with a systolic blood pressure from 120 to 139 or a diastolic blood pressure from 80 to 89 mmHg, and has body mass index equal to or greater than 25 $kg/m^2$.

**Self-management promotion program** refers to a nursing intervention for supporting participant to manage their own health behaviors emphasized in dietary and exercise based on self-management method which comprised of three components including health assessment and motivation, self-management skill training, and self-management practice and monitoring.

Health assessment and motivation refers to nursing activities that encourage the participants to assess health problem and health behaviors, and encourage participants to motivate themselves for behavior change and set goal.

Self-management skill training refers to nursing activities that provide education and training to the participants including hypertension, healthy diet, exercise, and self-management skills.

Self-management practice and monitoring refers to nursing activities that encourage the participants to perform self-management skills and use telephone calls and home visits to monitor and evaluate the participant practice.

**Conventional care** refers to the routine nursing care given by community health nurse for persons with prehypertension and obesity through providing individual and group health education about hypertension and lifestyle modification including eating, exercise, emotion, and reducing smoking and drinking.

**Expected Benefits**

1. This study would provide additional knowledge to fulfill nursing practice in service of primary prevention of hypertension and develop a clinical practice guideline.
2. Person with prehypertension and obesity had better management in healthy diet and exercise through self-management skills.
3. Reducing blood pressure and BMI led to delay the onset of hypertension and decrease cost of hypertension treatment.

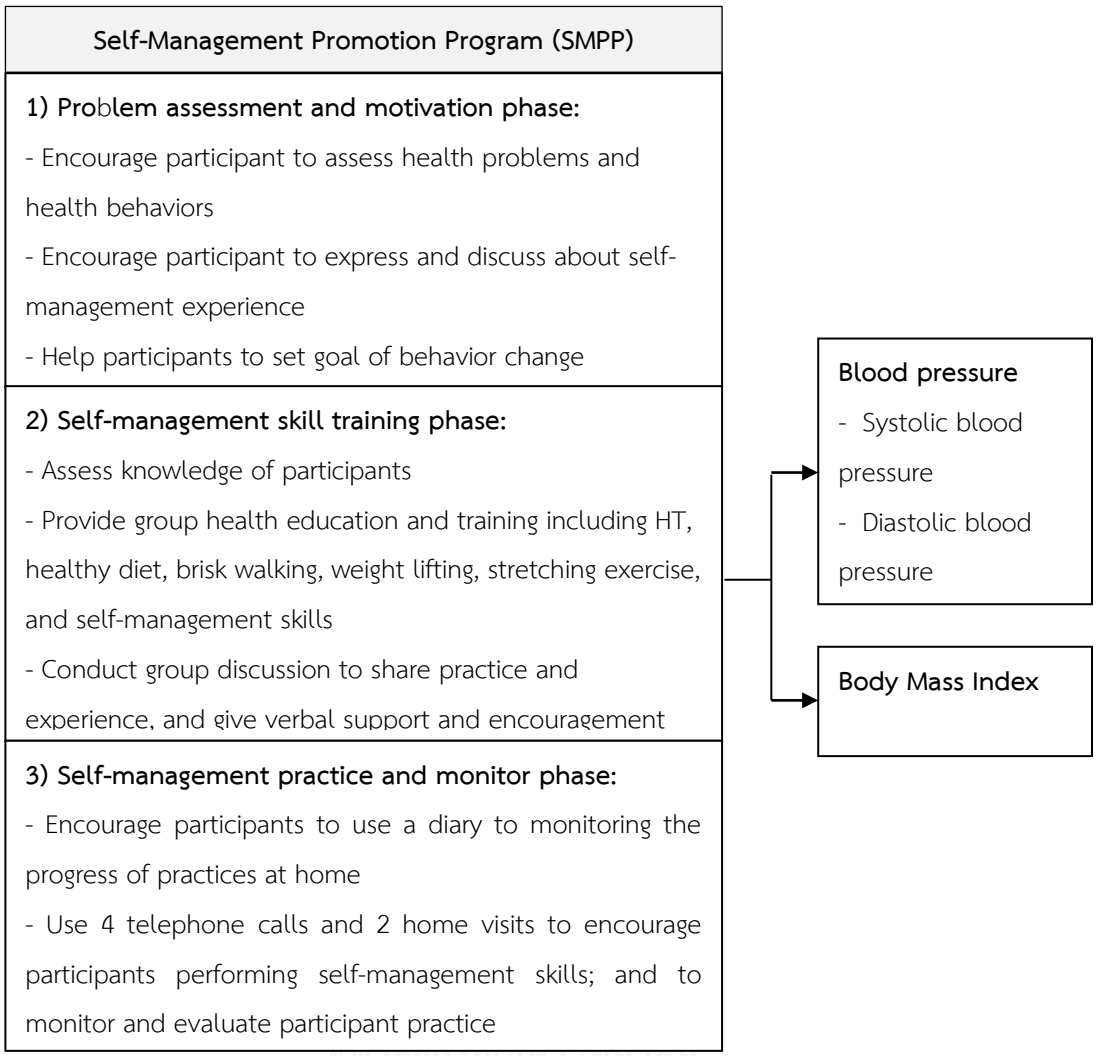


**Figure 1** Conceptual framework

# CHAPTER II

# LITERATURE REVIEW

A significant literature review of this study includes empirical finding, and theories related to the study. The reviews are described as follows:

1. Health system and nursing care system for hypertension and prehypertension in Thailand
    1.1 The prevalence of hypertension and prehypertension in Thai population
    1.2 Healthcare and nursing care for person with prehypertension
2. Prehypertension and obesity
    2.1 Persons with prehypertension and obesity
    2.2 Risk factors of progression from prehypertension to hypertension
    2.3 Impact of prehypertension and obesity
    2.4 Treatment of prehypertension and obesity
3. Blood pressure
    3.1 Definition of blood pressure
    3.2 Measurement of blood pressure
4. Body mass index
    4.1 Definition of body mass index
    4.2 Measurement of body mass index
5. Self-management theory
    5.1 Definition of self-management
    5.2 Theoretical underpinning self-management
6. Self-management intervention in chronic disease to reduce blood pressure or body mass index
7. Interventions for lowering blood pressure and BMI in persons with prehypertension and obesity

## 1. Health system and nursing care system for hypertension and prehypertension in Thailand

### 1.1 The prevalence of hypertension and prehypertension in Thai population

Prehypertension was designed to increase awareness of health care professionals and the public regarding the relationship between prehypertension and the serious conditions including hypertension, heart attack, heart failure, stroke, and kidney disease (Chobanian et al., 2003). In Thailand, the National Health Examination Survey (NHES) revealed that overall prevalence of prehypertension among Thai adults aged over 15 years was 32.8% (36.7% in male and 29.0% in female). It had estimated that 14.7 million Thai people with prehypertension including 8.0 million in male and 6.7 million in women. For hypertension, the prevalence was 22%, with hypertension being more prevalent in male compared with female. The results showed that the prevalence of prehypertension decrease with age, whereas the prevalence of hypertension increased with age. The prevalence of prehypertension was higher in middle age group compared with hypertension, while the prevalence of hypertension was higher in the elderly group compared with prehypertension (Aekplakorn et al., 2008).

In 2012, key performance indicators were required by the Ministry of Public Health (MOPH) including risk and disease screening for hypertension for Thai populations. Bureau of Policy and Strategy (2012) proposed that 79.2% of Thai people aged 35 years and older receiving blood pressure screening were prehypertension and 33.2% were hypertension. Later year, Bureau of Policy and Strategy (2013) proposed that persons with prehypertension in 2012 developing to hypertension were 8.2% (271,837 individuals). Correspondingly, the fifth NHES reported that the prevalence of hypertension had increased from 22.0% in 2009 to 24.7% in 2014 (Aekplakorn, 2014)

Developing hypertension, data from observational studies had indicated that risks of mortality from both ischemic heart disease (IHD) and stroke were doubled for each increment of every 20 mmHg of systolic or 10 mmHg of diastolic increase in

blood pressure among in middle-age and elderly (Lewington, et al., 2002). Moreover, Framingham Heart Study found that blood pressure between 130–139/85–89 mmHg were associated with a more than twofold increase in relative risk from cardiovascular disease (CVD) as compared with those with BP levels below 120/80 mmHg (Vasan et al., 2001). Therefore, prevention of progression from prehypertension to hypertension might be help to decrease risks of mortality from IHD, CVD, stroke and related serious conditions.

**1.2 Healthcare and nursing care for person with prehypertension**

Under the Ministry of Public Health (MOPH), there are three levels of health care provision including primary, secondary, and tertiary care. Service delivery through the MOPH is comprised of general hospitals or regional hospitals, community hospital, and health centers and community.

General and regional hospitals are located at the provincial level. The number of beds in such facilities ranges from 200 to 700. Their main responsibility is to provide secondary and tertiary care. They serve as referral centers for specialized medical services. They are specialized consultative health care, usually for inpatients and on referral from a primary or secondary care.

Community hospitals serve as the first referral level for curative care. The number of beds in these facilities ranges from 10 to 120. Their major roles are to provide comprehensive services to the population in their immediate catchment areas. They have a greater potential than the health centers for outreach services and innovative program development. The main staff is comprised of doctors, nurses, dentists, pharmacists, sanitarians and general supportive personnel. There are no specialist posts in community hospitals.

Health centers or primary care units (PCU) provide primary care at the Tambon level and referrals to higher levels of service. Staffing is sanitarians, technical nurses, and nurse averaged 3.5 personnel per center. Their catchment areas cover a population of 5000. The centers provide basic curative care under supervision of community hospital doctors. Health centers deliver mostly preventive and health

promotion services through an outreach community-based approach with village volunteers. Primary care is the key department entrusted by the people of Sub-Districts with the fundamental responsibility for the health of communities' population.

Management of hypertension represents an enormous challenge for health care systems at every level development. In the real situation, the PCU has the responsibility for treatment especially the treatment of chronic diseases including hypertension. The PCU will refer patients to the higher level of health care unit composing community and region hospitals for secondary and tertiary care, when PCU cannot give treatment for patients with complication or uncontrolled their blood pressure. However, hypertension is associated with lifestyle factors which can be prevent or delay the onset of hypertension (Bradley, 2011).

In 2013, the Policy of Ministry of Public Health (MOPH) mentioned the Surveillance, Control, and Preventions Systems to reduce hypertension which was primary screening of hypertension by using seven color balls to classified levels of hypertensions (Health Education Division, 2013). The levels of severity of hypertension were classified into seven color balls as 1) normal (<120/80 mmHg, white), 2) person who risk of hypertension (120/80–139/89 mmHg, light green), 3) patients with controlled blood pressure (<139/89 mmHg, dark green), 4) mild (140/90–159/99 mmHg, yellow), 5) moderate (160/100–179/109 mmHg, orange), 6) severe (<180/110 mmHg, red), and 7) patients with complication (black).

For persons who had blood pressure in prehypertension category, they are not defines as patient, so they are found a large numbers in community compared with in hospital. Moreover, they are not the candidates for medication treatment, but lifestyle modification is recommended (Chobanian et al., 2003). Therefore, nurses who are staff in PCU have responsibility to provide services for preventing hypertension disease and promoting health behaviors in this population. The surveillance systems assesses his or her risk behaviors, provides mass health education, and encourage them to change behaviors with best practice of 3Es (Eating, Exercise, and Emotion) and 2Rs (Reducing tobacco and alcohol) (Health

Education Division, 2013). Although MOPH support the Surveillance, Control, and Preventions Systems to reduce prevalence and complications of hypertension, hypertension is still a serious problem for millions of Thai populations.

## 2. Prehypertension and obesity

### 2.1 Persons with prehypertension and obesity

#### 2.1.1 Prehypertension

In 2001, data from Framingham cohort study (Vasan et al., 2001) revealed that adults with blood pressure of 120-129/80-84 mmHg increased risk of developing HT about a fourfold, compared with adults with blood pressure less than 120/80 mmHg, and adults who had blood pressure of 130-139/85-89 mmHg increased risk of HT about a 12-fold. Two years later, the seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) introduced the new term of blood pressure category as "prehypertension" which was people with systolic blood pressure (SBP) between 120 to 139 mmHg or diastolic blood pressure (DBP) between 80 to 89 mmHg. This blood pressure level was lower than HT range, but it still above normal BP level (Chobanian et al., 2003).

The JNC 7 report showed the classification of blood pressure for adults age 18 and older. Blood pressure was classified into four categories: normal, prehypertension, stage I hypertension, and stage II hypertension. This classification based on the average of at least two blood pressure readings with sitting position (Chobanian et al., 2003). The classification of blood pressure proposed by JNC 7 illustrated as table 1.

**Table 1** Classification of blood pressure (mmHg)

| Category | Systolic | | Diastolic |
|---|---|---|---|
| Normal | <120 | and | <80 |
| Prehypertension | 120–139 | and/or | 80–89 |
| Stage 1 hypertension | 140–159 | and/or | 90–99 |
| Stage 2 hypertension | ≥160 | and/or | ≥100 |

### 2.1.2 Obesity

Obesity was considered as serious health problems with an increasing prevalent condition throughout the world and its relation to adverse health consequences. The global obesity trends in adults had increased from 28.8% in 1980 to 36.9% in 2013 for men and from 29.8% to 38.0% for women (Ng et al., 2014). In Thailand, the fifth National Health Examination Survey (NHES V) showed that the prevalence of obesity had also increased significantly from 28.4% in 2008 to 32.9% in 2013 for men and from 40.7% to 41.8% for women (Aekplakorn, 2014).

Obesity resulted from an energy imbalance between energy intake and energy expenditure (Bray & Champagne, 2010), and it was defined as abnormal or excessive fat accumulation that may impair health (Garrow, 1988). For adults, obesity was determined by using an individual's weight and height in an equation to calculate body mass index (BMI), which was defined as the weight in kilograms divided by the square of the height in metres ($kg/m^2$). World Health Organization (2000) proposed classification of weight for Asian by body mass index which classified into five categories including underweight, normal, overweight, obesity grad I, and obesity grade II. An adult who had a BMI of 25 and higher was considered as obesity. The classification of obesity for Asian by BMI illustrated as Table 2.

**Table 2** Classification of obesity for Asian by body mass index

| **Classification** | **Body Mass Index ($kg/m^2$)** |
|---|---|
| Underweight | <18.5 |
| Normal weight | 18.5-22.9 |
| Overweight | 23-24.9 |
| Obesity I | 25-29.9 |
| Obesity II | $\geq$ 30 |

### 2.1.3 Prehypertension and obesity

Person with prehypertension and obesity refers to person with blood pressure in range of 120-139/80-89 mmHg and body mass index as 25 kg/m2 and higher. Prehypertension and obesity was recognized an increased risk of stroke cardiovascular disease (CVD), and HT (Chobanian et al., 2003; Lee et al., 2011). The several studies focused on the association between prehypertension and obesity. Firstly, the results demonstrated persons with prehypertension were likely to be obesity. Greenlund, Daviglus, and Croft (2009) studied differences in lifestyle characteristics between prehypertension and normal blood pressure. The results showed that persons with prehypertension were less likely to have a normal weight than persons with normal blood pressure.

Consistently, Jang et al. (2012)'s study using data from the third Korea national health and nutrition examination survey found that 52.80% of middle-aged adults were prehypertension and about 42.5% of them were obesity (39.5% in men and 44.7% in women). In addition, Wakabayashi (2012) found the odds ratios for prehypertension among participants with obesity compared participants without obesity was 3.19 in men and 5.55 in women. In Thailand, data from the third National Health Examination Survey (NHES III) showed the prevalence of prehypertension was 32.8%, and was rising rapidly compared with previous survey. The prevalence of HT increased with age while the prevalence of prehypertension decreased with age. Moreover, prehypertension associated with increased levels of BMI especially BMI in obesity range.

The second interesting result was the progression from prehypertension to HT in obese adults. The previous studies provide the evidence to support that person with prehypertension and obesity had a high risk of progression to HT. Obesity and weight gain were associated with 20-30% increased risk of HT (Vasan et al., 2001). The combination of prehypertension and obesity in adults appears to amplify the risk of HT and CVD. Winegarden (2005) focused on progression to HT using data obtained from two British Health and Lifestyle Surveys conducted for seven years, concluding that risk of the progression to HT rose sharply for participants who high normal

weight at follow-up, whether or not they were in the normal weight range at baseline (RR = 1.69 in normal weight at base line and RR = 1.65 in overweight). In another study, the results showed that prehypertension was associated with a four-fold increase in risk of progression to HT compared with persons with normal blood pressure, and persons with prehypertension and obesity was significantly higher in double progression to HT (Ferguson et al., 2010).

In conclusion, persons with prehypertension (blood pressure in range of 120-139/80-89 mmHg) and obesity (as BMI ≥25 kg/$m^2$) were still high progression to hypertension, and it was greater than persons with normal blood pressure and persons with prehypertension and normal weight. Therefore, prevention of hypertension in persons with prehypertension and obesity was needed.

**2.2 Risk factors of progression from prehypertension to hypertension**

According to most persons with hypertension usually progress from prehypertension, the risk factors of prehypertension and hypertension are almost similar. From the literature, the risk factors contributed to the development of prehypertension comprised of non-modifiable and modifiable risk factors (Chobanian et al., 2003). Non-modifiable risk factors, which meant they were not able to changed, included age, gender, and family history. Other risk factors were called modifiable risk factors, which could be changed. These factors were obesity, high salt intake (sodium), alcohol consumption, low physical activity and exercise, and smoking (Bradley, 2011). Non-modifiable and modifiable risk factors were described as follows:

**2.2.1 Non-modifiable risk factors**

**2.2.1.1 Age:** There were a large numbers of persons with prehypertension who aged 35-60 years and they were obesity (Aekplakorn et al., 2008; Guo et al., 2011, Thiangtham et al., 2013). Data from the Framingham cohort study illustrated that adults age 35 to 64 years with a blood pressure of 120-129/ 80-84 mmHg had a proximately a fourfold increased risk of incident HTN, and those with a blood pressure of 130-139/85-89 mmHg had nearly 12-fold (Vansan, 2001). The prevalence of prehypertension had increased in adulthood whereas the prevalence

of HT increased in elderly (Aekplakorn et al., 2008). There was a natural tendency for blood pressure to rise with age due to the reduced elasticity of the arterial system. Previous study found that age associated with progression to hypertension (Vasan, 2001).

**2.2.1.2 Gender:** Regarding the higher prevalence of prehypertension and obesity in men compared to women, men were more at risk of hypertension than women (Gosnell, 2015). Men more likely to be high blood pressure in early and middle age while women were more likely to be high blood pressure in age above 55 years (Sandberg & Ji, 2012). The meta-analysis study found that men were the predictor of progression to hypertension (Guo et al., 2011). These studies indicated that gender played a role of progression to hypertension.

**2.2.1.3 Family history:** Numerous family studies established family history of hypertension as risk factor of hypertension (Ranasinghe, Cooray, Jayawardena, & Katulanda, 2015). Family history of hypertension increased risk of progression to hypertension in other person in the family especially family of a close blood relative such as parents and sibling (Bradley, 2011). About 60 % to 70% of hypertension had persons with hypertension within families (Emerson, 2011). Family history of hypertension was ascribed to genetic factor that was an important risk factor for prehypertension progress to hypertension.



**2.2.2 Modifiable risk factors**

**2.2.2.1 Overweight or obesity:** An energy imbalance between energy intake and energy expenditure led to overweight and obesity (Galgani & Ravussin, 2008; WHO, 2013). The Framingham heart study found that a 5% weight gain on follow-up increased odds for hypertension with 20%-30% (Vanson, 2001). Each 10% weight gain was associated with a 6.5 mmHg increasing in SBP. Correspondingly, the meta-analysis study revealed that overweight or obesity was predictors of progression from prehypertension to hypertension (Gou et al., 2011).

**2.2.2.2 High salt intake:** Salt was an ionic compound composed of sodium chloride. Sodium serves as an important nutrient in the body and helps

nerves and muscles to function correctly (Kyu, 2014). Increased salt intake had long been suspected as an etiologic factor in the development of hypertension. Salt caused an elevation in blood volume, increased the sensitivity of cardiovascular or renal mechanisms to sympathetic nervous system influences, or exerted its effects through some other mechanism such as the renin-angiotensin-aldosterone system (Porth, 2009).

**2.2.2.3 Excessive alcohol drinking:** There was evidence of an association between excessive alcohol drinking and increased blood pressure, which were the top five risk factors for the growing global non-communicable disease (GBD 2013 Risk Factors Collaborators., 2016). Zheng et al. (2009) studied predictors of progression from prehypertension to hypertension in adults following a population for 28 months. The findings illustrated that alcohol drinking was associated with the prehypertension to hypertension progression. Effect of alcohol on blood pressure involved central nervous system influencing cardiac output and the peripheral vascular leading to increase blood pressure (Husain, Ansari, & Ferder, 2014).

**2.2.2.4 Low physical activity and exercise:** Physical activity was defined as any bodily movement produced by skeletal muscles resulting in energy expenditure. Exercise was subset of physical activity including planned, structured, and repetitive bodily movement (Casperson et al., 1985). Among adults with prehypertension with low level of physical activity had a 40% higher risk of progression from prehypertension to hypertension compared with those who engaged in moderate physical activity (Zheng et al., 2010). During exercise, blood flow was greater and blood vessels in muscles dilated that affected to decrease vascular resistance leading to decrease blood pressure. Previous study found that low physical activity and exercise was predictor of progression to hypertension (Sun et al., 2010); whereas, persons who engaged regular exercise were slow progression (Kim et al., 2010).

**2.2.2.5 Smoking:** Smoking was not directly effect to blood pressure, but chemical in cigarette smoke caused injury to the vascular endothelium. The nicotine in smoke raised blood pressure and heart rate. Smoking increased risk

for the buildup of fatty substances or plaque inside the vessels leading to narrow vessels and hard wall of vessels that affected to endothelial dysfunction, thrombosis, atherosclerosis, infraction, coronary artery disease, stroke, and death (Rahman, 2007). The rate of progression from prehypertension to hypertension in current smokers was high both male and female (Ferguson et al., 2010).

Persons with prehypertension and obesity were stated that persons who had high normal blood pressure and high BMI. High BMI resulted from an energy imbalance between energy intake and energy expenditure. It related to eating too much and lack of exercise. (Ted, Bray, Temple, & Struble, 2010). Boeckner et al. (2007) studied eating behaviors in midlife to older women. More than half of the participants were prehypertension and obesity. The findings showed that participants had energy intakes in excess of energy requirement including calories from fat while eating fruits, grains, and dietary fibers were below target levels. Consistently, current study in Thailand revealed that this population was eating salt diet, high fat diet, and low exercise (Rasamejam et al., 2013; Saengdet & Limtragool, 2012; Tremongkontip et al., 2012). This data showed that inappropriate eating and exercise behaviors should be concerned in this population. Therefore, the intervention of this study should focus on healthy eating and exercise behavior.



### 2.3 Impact of prehypertension and obesity

Impact of prehypertension and obesity, which deteriorated major target organs, was a consequence from degenerative change of vascular that affected various organs such as heart, brain, renal, and peripheral vascular. People who were uncontrolled blood pressure and body mass index had risk to these complications as follows:

**2.3.1 Cardiovascular diseases:** High blood pressure and obesity was a major risk factor for hypertension and cardiovascular disease that was the leading cause of morbidity and mortality (Emerson, 2011; Bradley, 2011). About 28% to 32% of persons with prehypertension developed to hypertension during 28 months to 4 years follow up, and persons with prehypertension and high normal of body mass index were higher the rate of progression to hypertension with 1.87 times compared

with normal weight (Ferguson et al., 2010; Zheng et al., 2009). A meta-analysis of 61 prospective studies indicated that mortality from ischemic heart disease had increased in a relationship with blood pressure, from levels as low as 115 mmHg in systolic and 75 mm Hg in diastolic (Chobanian et al., 2003; Lewington et al., 2002). Prehypertension elevated the risk of cardiovascular disease and coronary heart disease with 1.55 and 1.50 times, respectively (Huang et al., 2013).

**2.3.2 Stroke:** The second common cause of death and a major cause of disability worldwide was stroke. Currently, prehypertension was confirmed association with increased risk of hypertension, ischmic stroke, and hemorrhagic stroke (Chobanian et al., 2003; Ferguson et al., 2008; Lee et al., 2011). High blood pressure increased a strain on blood vessel throughout body, including brain. This strain could damage blood vessels and it caused of blood vessels become to harder and narrower. This cause led to clot within vessels more likely to occur, which could cause an ischemic stroke. On the other occasions, the extra strain could make blood vessel wall weaker and it could tear causing bleeding in brain which called hemorrhagic stroke. The meta-analysis of twelve studies proved that the incident stroke was largely driven by higher-range prehypertension (130-139 mmHg in systolic and 85-89 mmHg in diastolic) and was especially relevant in young and middle-aged persons (Lee et al., 2011).



**2.3.3 Kidney diseases:** The risk of kidney disease increased substantially if prehypertension was present in obese participants (Munkhaugen, Lydersen, Wideroe, & Hallan, 2009). Prehypertension and obesity were associated with increased risk for the onset of end-stage-renal disease and chronic kidney disease (CKD) death (Lucchese, 2010). Compared to participants who experienced a body mass index increase of higher 10% had increased risk of chronic kidney disease with 1.27 times (Hall et al., 2014). Obesity was risk factor of high blood pressure which could damage blood vessels throughout the body. Blood vessels in kidney were damaged leading to renal ischemia and dysfunction. Renal dysfunction might stop removing wastes and extra fluid from the body.

**2.3.4 Retinal damage:** Retinal damage resulted of atherosclerosis produced by high blood pressure which could change or damage blood vessels in the retina and optic nerve. The level of damage depended on severity and duration of high blood pressure. Manifestations of severe retinal damage included blurred vision, retinal detachment, retinal hemorrhage, and loss of vision (Bradly, 2011; Emerson, 2011)

**2.3.5 Peripheral vascular disease:** High blood pressure speeded up the process of atherosclerosis in the peripheral blood vessels, leading to the development of peripheral vascular disease, aortic aneurysm, and aortic dissection. (Bradley, 2011).

Most complications from progression to HT related to the circulatory system, especially heart and blood vessels leading to damage major organs. The complications of HT could increase morbidity and mortality. Hypertension and its complications are the serious health problem.

**2.4 Treatment of prehypertension and obesity**

According to classification of blood pressure proposed by the seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure (JNC 7), persons with prehypertension and obesity were non-hypertensive patients. Thus, medical treatment was not recommended in this population, the treatment of prehypertension and obesity was non-pharmacological treatment or lifestyle modification. Lifestyle modification also referred to as adoption of healthy lifestyles which was the cornerstone for delaying or preventing the progression to hypertension in this population. The recommended lifestyle modification that had been shown to be capable of reducing blood pressure were weight reduction, adaptation of the Dietary Approaches to Stop Hypertension (DASH) eating plan, dietary sodium reduction, physical activity, moderation of alcohol consumption, smoking cessation, and relaxation (Chobanian et al., 2003; Council, et al., 2013; Gabb, et al., 2016; Thai hypertension society, 2015).

The goal of treatment for hypertension prevention in persons with prehypertension and obesity were to lower blood pressure to normal levels and prevent the progressive rise in blood pressure using the lifestyle modification. In addition, they were recommended to lower body mass index to normal weight as well (Chobanian et al., 2003). The weight-loss goal should be 5% to 10% of initial body weight or 0.5-1 kilogram per week (NIH, 2014). Lowering blood pressure and body mass index in this group had been related to changes in their lifestyle especially dietary and exercise behaviors. According to the recommendation of JNC 7, the European Society of hypertension (ESH), and the European Society of Cardiology (ESC), the dietary and exercise patterns for this population was recommended as follows:

### 2.4.1 Dietary pattern: Method and mechanism

Based on the literature review regarding dietary for lowering blood pressure and body mass index, The important part of the dietary recommendation for persons with prehypertension and obesity were dietary approach to stop hypertension, and dietary sodium reduction.

#### 2.4.1.1 Dietary Approach to Stop Hypertension (DASH)

The Dietary Approach to Stop Hypertension (DASH) diet eating plan had been confirmed that affected lower blood pressure in studies that were sponsored by the National Institutes of Health (NIH). The findings showed that blood pressures were reduced with an eating plan that was low in saturated fat, cholesterol, total fat, red meat, sweets, and sugar-containing beverages; and that emphasized fruits, vegetables, low-fat milk and milk products, fish, poultry, whole grains, nut and seeds. This eating plan was known as the DASH diet.

Numerous studies had investigated the mechanism of nutrition that related to blood pressure. An increase in protein intake might induce increase in renal plasma flow, renal size, glomerular filtration rate, and sodium excretion rate (Lin & Svetkey, 2012). Then, certain amino acids such as arginine and glutamic acid might act as a vasodilator and have independent blood pressure lowering effects. In addition, carbohydrate might contribute to the development of essential

hypertension through its glycemic effect. High glycemic index might create a chronic state of postprandial hyperinsulinemia sympathetic nervous system over activity, and vascular remodeling of renal vessels, leading to chronic activation of the renin-angiotensin-aldosterone system and development of essential hypertension.

Dietary fiber was resistant to hydrolysis by the digestive enzymes of humans. It had been referred to as no starch polysaccharides and might indirectly lower blood pressure through reduction of insulin level since hyperinsulinemia was often associated with obesity and impaired glucose tolerance, and it might be in the causal pathway to hypertension (Lin & Svetkey, 2012). Therefore, the DASH dietary pattern reduced both SBP and DBP pressure by 5.5 mmHg and 3.0 mmHg, respectively; moreover, blood pressure reduction came fast within two weeks of engaging the plan (Chobanian et al., 2003; NIH, 2006).

The DASH eating plan not only reduce blood pressure, but it also reduce body weight and body mass index (NIH, 2006) since it was based on fruits, vegetables, low fat, low sugar, and other key of the DASH food. Losing weight was recommended as one of lifestyle changes to manage high blood pressure and obesity (Chobanian et al., 2003). This was confirmed by the results of two meta-analysis study regarding the effect of DASH diet plan on blood pressure and weight reduction that this diet plan significantly reduced systolic blood pressure, diastolic blood pressure, and body weight (Azadbakht et al., 2005; Siervo et al., 2014).

The DASH eating plan comprised a number of daily servings from various food groups. The number of servings depended on individual's daily caloric need depending on age, gender, and activity level. Activity level was categorized into three groups including sedentary, moderate, and active. Sedentary was light activity as part of typical day-to-day routine. Moderately active was activity equal to walking about 1 to 3 miles a day at 3-4 mile per hour, plus light activity. Active was activity equal to walking more than 3 miles per day at 3 to 4 miles per hour, plus light activity. For female age range 31-50 years, daily calorie needs was 1,800, 2,000, and 2,200 calories in sedentary, moderate active, and active, respectively; while those aged 51 and higher needed calories as 1,600, 1,800, and 2,000 to 2,200 calories. For

male aged range 31-50 years, daily calorie needs was 2,200, 2,400 to 2,600, and 2,800-3,000 calories in sedentary, moderate active, and active, respectively; while those aged 51 and higher needed calories as 2,000, 2,200 to 2,400, and 2,400 to 2,800 calories, respectively. The number of servings from each food group was given in table 3.

Table 3 The DASH diet eating plan

| Food group | Daily Servings | | | | Example serving size |
|---|---|---|---|---|---|
| | Calories per day | | | | |
| | 1,600 | 2,000 | 2,600 | 3,100 | |
| Grains | 6 | 6-8 | 10-11 | 12-13 | 1 slice bread, 1 Oz dry cereal ½ cup cooked rice, or pasta |
| Vegetables | 3-4 | 4-5 | 5-6 | 6 | 1 cup raw leafy vegetable, ½ cup cooked vegetable, ½ cup vegetable juice |
| Fruits | 4 | 4-5 | 5-6 | 6 | 1 medium fruit, 1/4 cup dried fruit, ½ cup fresh, frozen, or canned fruit, ½ cup fruit juice |
| Fat-free or low fat milk & milk products | 2-3 | 2-3 | 3 | 3-4 | 1 cup milk or yogurt 1½ oz cheese |
| Lean meats, Poultry & fish | 3-6 | ≤ 6 | 6 | 6-9 | 1 oz cooked meats, poultry, or fish, 1 egg |
| Nuts, seeds, and legumes | 3 per week | 4-5 per week | 1 | 1 | 1/3 cup nuts, 2 Tbsp peanut butter, 2 Tbsp seeds, ½ cup cooked legumes |
| Fats and oils | 2 | 2-3 | 3 | 4 | 1 tsp soft margarine, 1 Tbsp mayonnaise, 2 Tbsp salad dressing |
| Sweets and added sugars | 0 | ≤ 5 | ≤ 2 | ≤ 2 | 1 Tbsp sugar, 1 Tbsp jelly or jam, ½ cup sorbet, gelatin, 1 cup lemonade |

Modified from: NIH, 2006; Tbsp, tablespoon; tsp, teaspoon

In Thailand, Nutrition Division, Department of Health, MOPH (2001) designed the Nutrition Flag to promote greater understanding of the good health guideline for Thai people that are based on the food-based dietary guidelines for good health. The Nutrition Flag was designed to suggest portion, quantity, and variety of food required daily for Thai people. It represented a way to consume food that will enable Thai people to have adequate diets and healthy eating to promote good health.

The Nutrition Flag suggested that eat adequate foods from the five groups in the amount that is appropriate for the body's requirement. The five groups of foods were categorized into 1) rice produce including other grains and starchy food group, 2) vegetables, 3) fruit, 4) meat, legumes, and egg, and 5) milk group. For oil, sugar, and salt, the Nutrition Flag recommended consuming in limited amounts. Moreover, it recommended amount of food was divided into three groups according to the energy need: 1,600, 2,000, and 2,400 Kcal as described in table 4.

**Table 4** The proportion of foods in the Nutrition flag

| Food group | Unit | Energy used (Kcal) | | |
|---|---|---|---|---|
| | | 1,600 | 2,000 | 2,400 |
| **Rice-starchy foods** | Rice-serving spoon | 8 | 10 | 12 |
| **Vegetable** | Rice-serving spoon | 6 | 5 | 6 |
| **Fruit** | Portion | 4 | 4 | 5 |
| **Meat** | Spoon | 6 | 9 | 12 |
| **Milk** | glass | 1 | 1 | 1 |
| **Oil, sugar, and salt** | teaspoons | Limited amounts | | |



The body's requirement was divided into three categories as follows:

1. 1,600 Kcal for children aged 6-13 years; working women aged 25-60 years; or elderly older than 60 years.

2. 2,000 Kcal for teenagers and young adults aged 14-25 years; or working men 25-60 years.

3. 2,400 Kcal for those who need more energy such as laborers, farmers, athletes etc.

As literature review, DASH diet pattern had effectively reduced blood pressure for persons with prehypertension and hypertension. It was the eating pattern that was low in saturated fat, cholesterol, total fat, red meat, sweets, and sugar-containing beverages; and that emphasized fruits, vegetables, low-fat milk and milk products, fish, poultry, whole grains, nut and seeds. However, the DASH diet was designed to American people and the amount of good was not easy for Thai people. Therefore, the healthy diet eating in this study was developed based on DASH diet and the Nutrition Flag for persons with prehypertension and obesity.

**2.4.1.2 Dietary sodium reduction**

Sodium was an important nutrient in the body since it helped nerves and muscles to function correctly, and it was also involved in the auto-regulation of the water and fluid balance of the body (Kyu, 2014). The normal concentration was maintained through neural and hormonal control of sodium excretion and absorption, with excess sodium being excreted in the urine and skin. Overtime, prolonged increase in dietary sodium intake could result in raising the amount of sodium in blood circulation and wrecked the fluid balance, reducing the ability of kidneys to remove the water resulting in increasing blood volume. This caused fluid retention which increased the pressure in blood vessel. The kidney did this by retaining water, which eventually led to vascular damage, such as arterial stiffness, thus increasing blood pressure (Kockrow, 2011; Kenned, 2011).

Although sodium was required for physiologic functions, the amount of dietary sodium needed for adults estimated 2,400 mg a day (Chobanian et al., 2003). Prior study looked at the effect a dietary sodium reduction and DASH diet on blood pressure and sodium level was categorize into three sodium levels including a higher intake of about 3,300 milligrams per day (the level consumed by many Americans), an intermediate intake of about 2,300 milligrams per day, and a lower intake of about 1,500 milligrams per day (equal 6 gram salt or 2/3 teaspoon salt). The results showed that the greatest blood pressure reductions were for the DASH eating plan at the sodium intake of 1,500 milligrams per day. Participants with high blood pressure were the greatest reductions, but those with prehypertension

also had large decrease (Sack et al., 2011). The further guideline recommended reducing dietary sodium intake to less than 1,500 mg per day to improving the health of all Americans through implementation of national goals for health promotion and disease prevention on the 2010 dietary guidelines for Americans.

A variety of foods contained a little natural sodium such as celery, egg, milk, seafood, and meat (Lin & Svetkey, 2012). It also found in salt and processed foods such as canned vegetable, canned meat, frozen meats, sausage, bacon, curries, soups, and fish-sauce (Center for Science in the Public Interest, 2005). In Thailand, the Bureau of Non Communicable Disease (2013) reported that the average Thais salt intake was 10.9 + 2.6 grams estimated 4,351 mg per day which was higher than the recommendation of sodium intake for adults. Furthermore, major of sodium source in Thai people was sauces (80.3% of dietary sodium sources). The sources of sodium Thais consume included fish-sauce, light soy sauce, salt, shrimp paste, oyster sauce, instant noodle, canned fish, meat ball, streaky pork with crispy, French fries, and salted egg.

Following the sodium reduction diet guidelines and literature review, advices for people to reduce sodium diet intake were an important to reduce blood pressure and delay progression to hypertension. Advices for reduce sodium diet intake were 1) avoiding processed foods due to they was often added high-salt content foods such as canned foods and frozen foods; 2) reducing the consumption of processed supermarket, canteen, restaurant, and fast food; 3) avoid adding salt to foods and eliminating salt from the table and in cooking including other condiments such as fish-sauce, soy sauce, teriyaki sauce, and barbeque sauce; 4) seeking low-salt recipes or use other ingredients and delete the salt added; and 5) look at sodium levels on nutritional labels that increased awareness of salt consumption.

As literature review, hypertension prevention in persons who were high risk group including persons with prehypertension and obesity should reduce or control salt diet intake less than 1,500 mg per day (2/3 teaspoon). Moreover, avoiding foods in high sodium were a processed food, a canned food, a frozen meats and dinner, and condiments.

### 2.4.2 Physical activity and exercise: Method and mechanism

In 2004, World Health Organization (WHO) recognized that physical activity was one of the core modifiable risk factors of non-communicable diseases (NCDs) including hypertension, and endorsed it as global strategies to promote and protect health leading to reduce morbidity and mortality of NCDs which related to physical inactivity (WHO, 2004). Physical activity was defined as any bodily movement produced by skeletal muscles that resulted in energy expenditure (Caspersen, Powell, & Christenson, 1985). It was encompassed activities of daily living (such as house work, gardening, stair climbing), occupation-related activity (such as walking, lifting, packing), transportation physical activity (such as walking, biking, cycling), and leisure time activity (such as exercise, sports recreation, hobbies) (Dugdill, Crone, & Murphy, 2008).

Physical activity had been enormous benefits to reduce the risk of metabolic syndrome (Huang & Liu, 2014), diabetes mellitus (Pai et al., 2016), cardiovascular disease (Lee et al., 2014), and hypertension (Diaz & Shimbo, 2013). However, evidence supported that leisure-time physical activity (LPA) especially exercise reduce risk of cardiovascular disease and hypertension by reducing SBP, DBP, and body mass (Farinatti, Monteiro, & Oliveira, 2016). Results from two meta-analysis studies revealed that exercise could reduce both SBP and DBP (Punia, Kulandaivelan, Singh, & Punia, 2016; Carpio-Rivera et al., 2016). One meta-analysis examined 24 articles found that duration of intervention from +3 weeks to 12 months with each session lasting 15–60 minutes and frequency from 3 to 8 times/week. There was mean reduction of −5.00 mmHg in SBP and −3.09 mmHg in DBP after aerobic training.

The benefits of a proper exercise regimen include: Increase in the efficiency of cardiovascular and respiratory function, reduction in coronary artery disease risk factors, reduction in blood pressure, increase in HDL and decreased triglycerides, reduction of body fat, reduced insulin needs, and improved glucose tolerance. However, there are some changes in body from exercise. Exercise stimulates the growth of new blood vessels, causing blood pressure to decrease in fit people. It also increased blood flow that benefits the brain. The brain cells will start

functioning at a higher level and make feel more alert and awake during exercise and more focused afterward. The brain releases dopamine and glutamate, as well as gamma-aminobutyric acid or GABA. About the joints, each joint is lined with cushioning tissue at the ends of the bones called cartilage, as well as soft tissue and lubricating fluid, to help promote smooth and easy motion. Ligament and tendons provide stability (McArdle et al., 2016).

In addition, exercise also reduces body mass in overweight or obese adults leading to reduce body mass index which related to risk factors of progression to hypertension. Willis et al. (2012) conduct the randomized control trial study regarding effects of aerobic and/or resistance training on body mass and fat mass in overweight or obese adults and found that aerobic training was the optimal mode of exercise for reducing fat mass and body mass, while a program including resistant training was needed for increasing lean mass in middle-aged, overweight/obese individuals. It was consistent with meta-analysis by Kuhle et al. (2014). The findings showed that exercise for 3 to 9 months produced a significant reduction in body mass index (−1.01 kg/m2, 95% CI −2.00 to −0.01) and waist circumference (−3.09 cm, 95% CI −4.14 to −2.04).

#### 2.4.2.1 Principle of exercise prescription

The principles of exercise prescription by American College of Sports Medicine (ACSM) guidelines (Kiminsky, 2014) included Frequency, Intensity, Time, and Type as also called FITT principle. It was an important way of monitoring exercise program.

1) Frequency referred to the number of days per week dedicated to an exercise program. It was an important contributor health and physical fitness benefits that resulted from exercise. Frequency of exercise varied with the intensity and goal of exercise. In general adult, aerobic exercise was recommended on 3 to 5 day per week.

2) Intensity referred to level of effort at which the exercise is being performed. There is a positive dose response of health and physical fitness benefits those results from increasing exercise intensity. Moderate intensity aerobic exercise

was recommended for most adults. However, recent findings demonstrate the minimum threshold of intensity for benefit seems to vary depending on and individual's cardiorespiratory fitness and other factors such as age, health status, or habitual physical activity.

The effective methods for prescribing exercise intensity resulted in improvements in cardiorespiratory fitness that could be recommended for individualized exercise treatment. There were several methods of estimating intensity of exercise, but heart rate methods was commonly used to predict target heart rate and estimated maximum heart rate. Estimating intensity of aerobic exercise by using percentage of maximum heart rate (%HRmax) was categorized into 5 levels including very light (<57%), light (57%-64%), moderate (64%-76%), vigorous intensity (76%-96%), and near maximal to maximal (> 96%). The formula of target heart rate and HRmax were described as follows:

Target heart rate = HRmax X % of intensity desired

HRmax = 220 - age (year)

For example, for a 50-year-old person, the estimated maximum age-related heart rate would be calculated as 220 - 50 years = 170 beats per minute (bpm). The 64% and 76% levels would be:

64% level: 170 x 0.64 = 109 bpm and

76% level: 170 x 0.76 = 130 bpm

Thus, moderate-intensity exercise for a 50-year-old person would require that the heart rate remains between 109 and 130 bpm during exercise.

In addition, Talk test was a simple technique and subjective method of estimating appropriate cardiorespiratory exercise intensity. The method entailed maintaining an intensity of exercise at which conversation was comfortable. In general, if person who was doing moderate-intensity exercise he or she was able to talk but not sing during the activity. If person who was doing vigorous-intensity activity, he or she would not be able to say more than a few words without pausing for a breath. The research supported the usefulness of the Talk test and highlights its

ability to closely reflect actual heart rate (Persinger et al., 2004) and Talk test was often used to monitor aerobic exercise intensity.

3) Time or duration referred to length of time in which an exercise is performed. It was generally expressed in minutes. The recommended time of exercise might be performed continuously or intermittently and could be accumulated over the course of a day in one or more sessions of exercise that total at least 10 minutes per session.

4) Type referred to the mode of exercise. It was classified into aerobic, resistant, flexibility, and neuromotor exercises. Aerobic exercise, also known as cardiorespiratory exercise, involved large muscle groups and requires little skill to perform. It was recommended for all adults to improve health and cardiorespiratory fitness. Examples of this type of exercise included jogging, aerobic dancing, and bicycling. *Resistant exercise* or weight training was defined as exercise that caused the muscles to contract against an external resistance with the expectation of increasing strength, tone, mass, and/or endurance. Many types of resistance training equipment could be effectively be used to improve muscular fitness including free weights or machines with stacked weights. Resistance training regimens should include multijoint or compound exercises that affect more than one muscle group. Examples of this type of resistance exercises was low back extensions and abdominal crunches to target the muscles in the lower back and abdomen, and leg presses and leg curls to exercise the quadriceps and hamstring muscles. Flexibility exercises or stretching exercises were designed to improve ROM around a joint which was improved after engaging for 3-4 weeks of regular stretching at least 2-3 times per weeks. Neuromotor exercise was sometimes called functional fitness training and it involved motor skill such as balance, coordination, gait, and agility. The examples of this exercise were Yoga and Tai Chi.

For aerobic exercise, a meta-analysis examining the effect of walking intervention programs on blood pressure concluded that walking can lower both SBP and DBP (Kelley et al., 2001). Brisk walking was seen as a low cost and low risk of exercise that most people could undertake (Mutrie & Hannah, 2004) Increasing the amount of brisk walking that people undertake in their daily routines may be a

simple way to promote exercise and improve blood pressure. Moreover, meta-analysis study showed that fourteen of the studies reported decrease in BMI ranging from 0.2 to 2.0 kg following the brisk walking program (Murphy et al., 2007), and it is recommended as strategies to reduce blood pressure and BMI in people who had prehypertension and obesity (Chobanian et al., 2004; SIGN, 2010). Thus, brisk walking exercise was considered as strategy for persons with prehypertension and obesity to decrease blood pressure and BMI.

**2.4.2.2 Components of exercise**

A single exercise session comprised four phase including warm-up, conditioning and/or sports-related exercise, cool-down, and stretching described as follows:

1) The warm-up phase consisted of a minimum of 5-10 minutes of light to moderate intensity aerobic and muscular endurance activity. The warm-up was a transitional phase that allowed the body to adjust to the changing physiologic, biomechanical, and bioenergetics demands placed on it during the conditioning or sports phase of the exercise session. Warm-up also improved range of motion (ROM) and may reduce the risk of injuries (American College of Sports Medicine, 2013).

2) The conditioning phase included at least 20-60 minutes of aerobic, resistance, and flexibility exercise, and/or sports activities. It should perform (exercise bouts of 10 minutes were acceptable if the individual accumulated at least 20-60 minutes per day of daily aerobic exercise). An increasing intensity yielded a positive continuum of health and fitness benefits

3) The cool-down phase involving aerobic and muscular endurance activity of light-to-moderate intensity lasting at least 5-10 minutes. The purpose of cool-down period was allow of a gradual recovery of heart rate and blood pressure and removal of metabolic end products from the muscles used during the more intense exercise conditioning phase.

4) The stretching phase was distinct from the warm-up and cool-down phases and might be performed at least 10 minutes of stretching exercise following

the warm-up or cool-down phase or following the application of heat packs, because warming the muscles improved ROM.

**2.4.2.3 Recommendation of exercise for persons with prehypertension and obesity**

American College of Sports Medicine (ACSM)'s guideline (Kiminsky, 2014) had provided recommendation of exercise for prehypertension separated with recommendation for obesity. However, ACSM's guideline suggested that persons who had high blood pressure and obesity should focus on increasing caloric expenditure that was explained in recommendation of obesity. Both recommendations included frequency, intensity, time, and type of exercise. Exercise prescription for prehypertension and obesity was described as follows:

*Exercise recommendation for individual with prehypertension*

Frequency: aerobic exercise training should be performed on the most, preferably all days of the week and resistant exercise should be performed on 2-3 day per week.

Intensity: moderate intensity aerobic exercise (i.e. 40% - <60% VO2 or HRR) supplemented by resistance training at 60%-80% 1-RM.

Time: 30-60 minutes per day of continuous or intermittent aerobic exercise. If intermittent, use a minimum of 10 min bouts accumulated to total 30-60 30-60 minutes per day of exercise. Resistance training should consist of at least one set of 8-12 repetitions for each of the major muscle groups.

Type: emphasis should be placed on aerobic activity such as walking, jogging, cycling and swimming. Resistance training using either matching weights or free weights man supplement Arabic training. Such training consisted of 8-10 different exercise targeting muscle groups. However, consideration should be given to the level of blood pressure control, recent changes in antihypertensive drug therapy, medication-related adverse effects, and the presence of target organ disease and/or other comorbidities, and attachments should be made accordingly. Progression should be gradual, avoiding large increases in any of the FITT components of the exercise prescription, especially intensity for most individual with hypertension.

*Recommendation for individual with obesity*

Frequency: Aerobic exercise was performed more than 5 days per week. Resistant exercise was performed 2-3 day per week. Flexibility exercise was performed more than 2 day per week with daily being most effective.

Intensity: moderate-to-vigorous intensity aerobic activity should be encouraged. Initial exercise training intensity should be moderate (i.e. 40% - 59% $V_{O2}$ or HRR). Eventual progression to more vigorous exercise intensity (i.e. $\geq$ 60% $V_{O2}$ or HRR) may result in future health/ Fitness benefits.

Time: A minimum of 30 minutes per day (i.e. 150 minutes per week) progression to 60 minutes per day (i.e. 300 minutes per week) of moderate intensity, aerobic activity incorporating more vigorous intensity exercise into the total volume of exercise may provide additional health benefits. However, vigorous intensity exercise should be encouraged in individuals who are both capable and willing to exercise at a higher than moderate intensity level of physical exertion with recognition that vigorous intensity exercise is associated with the potential for greater injuries. Accumulation of intermittent exercise of at least 10 minutes an effective alternative to continuous exercise and maybe a particularly useful way to initiate exercise.

Type: The primary mode of exercise should be aerobic physical activities that involve the last muscle groups. As part of a balanced exercise program, resistance training and flexibility exercise should be incorporated.

In conclusion, exercise recommendation for persons with prehypertension and obesity was aerobic exercise, resistance training, and flexibility exercise at least 5 days per week. Duration of the aerobic exercise should be at least 30 minutes and progress to 60 minutes per day with moderate intensity (64%-76% of maximum heart rate (%HRmax). Resistant exercise was performed 2-3 days per week and flexibility exercise was performed more than 2 days per week with daily being most effective.

#### 2.4.2.4 Physical fitness

Physical fitness plays a crucial role in maintenance of health among persons with prehypertension and obesity. Improvement in physical fitness is associated with a lower risk of incident hypertension (HT), blood circulation improvement, weight reduction, muscle strength, and bone strong (Kaminsky, 2014; Lee et al., 2012). Physical fitness not only improves physical strength, but also mental strength including enhances one's memory (Niemann, Godde, & Voelcker-Rehage, 2014).

However, prior studies indicated a low level of physical fitness with 73.4% (Hageman, Pullen, Walker, & Boeckner, 2010), and more than 90% of persons with prehypertension and obesity are lack of exercise according to ACSM's recommendation (Kaminsky, 2014; Faselis et al., 2012; Rasamejam, Akaratanapol, & Durongritichai, 2013). Lack of exercise is associated with poor physical fitness (Warburton, Nicol, & Bredin, 2006).

Exercise was recommended for various population groups including persons with prehypertension and obesity to delay and prevent the occurrence of related disease (Chobanian et al., 2003). There was evidence to support that regular exercise associated with improvement in physical fitness which played a crucial role in maintenance of health. Physical fitness was defined as the capability of the heart, blood vessels, lungs, and muscles to perform their functions at optimal efficiency (Getchell, 1992). The purpose of physical fitness testing was in such exercise program included educating participants about their present health or physical fitness status, providing data that were helpful in development of individualized exercise prescription, collecting baseline and follow-up data that allow evaluation of progress by participants, and motivating participants by establishing reasonable and attainable health goal (Kiminsky, 2014).

Commonly, physical fitness testing included treadmills, cycle ergometers steps, and field tests. The use of mode of testing depended on the setting, equipment available, and training of personnel. For the community setting, field test appropriately conducted. In Thailand, recommendation of physical fitness

testing for Thai adults aged 19-59 years proposed by Department of Physical education (Samahito et al., 2013) including cardiorespiratory fitness, muscle endurance, and flexibility.

Cardiorespiratory fitness referred to the ability to perform large-muscle, dynamic, moderate-to-high intensity exercise for prolonged period. For field test, cardiorespiratory fitness was assessed by using 3 minute step test (Appendix M).

Muscular endurance referred to the ability of a muscle group to execute repeated contractions over a period of time. Muscular endurance was assessed by using 60 seconds chair stand test (Appendix M)

Flexibility referred to the ability to move a joint through its complete range of movement. It was evaluated by sit and reach test. Flexibility was assessed by using sit and reach test (Appendix M).

**3. Blood pressure**

**3.1 Definition of blood pressure**

Blood pressure is important variable that regulate the body function; especially, the function of the cardiovascular system. BP is defined as follows:

Porth (2009) defined blood pressure or arterial blood pressure as the force that distributes blood to the capillaries throughout body. The higher arterial pressure is SBP and the lowest is DBP.

Bradley (2011) defined blood pressure is the force exerted by the blood against the walls of the blood vessel. It must be adequate to maintain tissue perfusion requires the integration of both systemic factors and local peripheral vascular effects. Arterial blood pressure is primarily a function of cardiac output and systemic vascular resistance.

Emerson (2011) defined blood pressure as the physiologic result of the cardiac output and the resistance to ejection of blood from the heart. It is produce by the force of left ventricular contraction overcoming the resistance of the aorta to

open the aortic valve and is the pressure maintained in the arterial system throughout the cardiac cycle.

As definition of blood pressure, blood pressure is defined as the force of blood against the walls of the blood vessels by cardiac output and the resistance to ejection of blood from left ventricular to capillaries throughout the body in the arterial system. Blood pressure is recorded as two numbers including SBP and DBP (Porth, 2009), which the average of two or more measurement were undertaken. Blood pressure is measured in millimeters of mercury (mmHg) after participants has rested at least five minutes following JNC-7.

**3.2 Measurement of blood pressure**

There are two types of blood pressure measurement including direct and indirect measurement as follows:

**3.2.1 Direct measurement of blood pressure** is one aspect of hemodynamic monitoring and requires an intra-arterial catheter and specialized equipment to transducer the arterial fluid pulsations in to electrical signals. This is the most accurate method of measuring BP, but is typically only performed in controlled setting such as surgery or critical care units (Emerson, 2011).

**3.2.2 Indirect measurement of blood pressure** is most commonly used to measure blood pressure by using auscultatory and oscillatory method, which are described as follows:

**3.2.2.1 The auscultatory method** uses a stethoscope and a well-calibrated sphygmomanometer. In the measurement of BP, a cuff is placed around the upper arm. The cuff is inflated to a point at which its pressure exceeds that of the artery, occluding the blood flow. The return of blood flow through the artery is signaled by the sounds produced by the turbulent flow through the partially occluded artery (Korotkoff sounds). This sound is recorded as the SBP. As the pressure continues to be released, sounds change in intensity until the point at which the Korotkoff sounds disappear recorded as DBP (Emerson, 2011).

**3.2.2.2 The oscillatory method,** the most commonly used method, uses a microphone, arterial pressure pulse sensor as automated oscillometric sphygmomanometers, which produces a value that has been measured electronically (Emerson, 2011; Skirton et al., 2011). This method depends on the detection of pulsatile oscillations of brachial artery in blood pressure cuff, and it use an algorithm to calculate SBP and DBP.

Accurate measurement of blood pressure is essential to classify individuals, to ascertain BP–related risk, and to guide management. The auscultatory technique with a trained observer and mercury sphygmomanometer continues to be the method of choice for measurement in the office, using the first and fifth phases of the Korotkoff sounds. The use of mercury is declining, and alternatives are needed. Aneroid devices are suitable, but they require frequent calibration. Hybrid devices that use electronic transducers instead of mercury have promise. The oscillometric method can be used for office measurement, but only devices independently validated according to standard protocols should be used, and individual calibration is recommended. They have the advantage of being able to take multiple measurements. Proper training of observers, positioning of the patient, and selection of cuff size are all essential. It is increasingly recognized that office measurements correlate poorly with BP measured in other settings, and that they can be supplemented by self-measured readings taken with validated devices at home. There is increasing evidence that home readings predict cardiovascular events and are particularly useful for monitoring the effects of treatment. Twenty-four-hour ambulatory monitoring gives a better prediction of risk than office measurements and is useful for diagnosing white-coat hypertension. Therefore, this study used automatic blood pressure monitor device to measure blood pressure at baseline, during participation, and after completing program.

The oscillometric method validate according to standard protocols should be used, and individual calibration is recommended. Various guidelines have been published for the correct use of automated devices with specific methodologies (Chobanian et al. 2003; O'Brien et al., 2003; Parati et al., 2008a).

This study followed the standardized protocol from JNC-7. The process for obtaining the BP and calibration is as follows:

1) Participant preparation: Participant is seated comfortably with their back and the upper arm supported, with both feet on the floor at least 5 minutes in a quiet room, without an empty bladder. The participant is provided information regarding no exercise, no smoking, and no either caffeine or alcohol drinking within 30 minutes prior to measure blood pressure.

2) Measurement device preparation: Calibration of the automatic blood pressure monitor device is tested accuracy by manufacturing company. In addition, an appropriate cuff sized having at least 80 % of arm circumference is used to ensure accuracy.

3) Blood pressure measurement method: Participant's arm is supported at heart level, and the cuff encircle upper arm. When measuring blood pressure, participant is to relax as much as possible and not talk during measurement procedure. Two measurements are taken in succession, separately at least one minute. Before engaging program, blood pressure is measured in both arms, and arm with the higher blood pressure is used for continuing blood pressure monitor. The same arm side with highest BP is measured each times, and mean of SBP and mean of DBP, which are obtained two measurement, is recorded as the outcome of this study.

**4. Body mass index**

**4.1 Definition of body mass index**

Body Mass Index (BMI) is defined as a number of body fat based on height and weight that applies to adults, calculated by the weight in kilograms divided by the square of the height in meters (kg/m2), and is classified in to underweight (<18.5 kg/m2), normal weight (18.5-22.9 kg/m2), overweight (23.0-24.9 kg/m2), and obesity (>30 kg/m2) (WHO, 2000).

### 4.2 Measurement of body mass index

BMI is one of the most commonly used to estimate whether a person is overweight and obesity. It is used because it correlates reasonably well with person's level of body fat. It is also a relatively easy, cheap and non-invasive method for establishing weight status. Therefore, measurement of BMI comprises of two parts including weight measurement and height measurement

#### 4.2.1 Weight measurement

Weight measurement is measured in kilogram following guidelines by using digital floor scales. Scales is calibrated regularly to ensure accurate measurement by checking with the standard weight (Department of Health and Social Services, 2012). Moreover, the standardard protocols should be used for measuring weight so that inaccuracies are minimized. Department of Health and Family Services and the Indiana Department of Health (2008) have established basic standards for these procedures, including using measuring weight and height. The steps of weight measurement are described as follows:

1) Set up the balance beam or electronic scale as zero the scale before subject steps on the scale in a location

2) Have subject wear light clothing with shoes removed

3) Have subject empty out pockets of any objects such as keys and wallet.

4) Have subject stand in the center of the platform, and not touch other objects or persons, and read the measure.

5) Repeat until two weights agree within 1 kg, and record average of two. It is important to take two measurements to assure accuracy in BMI calculations.

6) At the end of measuring and recording the weight, return the scale to the zero position to ensure privacy for each subject

#### 4.2.2 Height measurement

Height measurement is measured in centimeter following guideline by using a portable stadiometer (Department of Health and Social Services, 2012). A portable stadiometer is calibrated by length rods or a standard measuring test rod at

least annually; The steps of height measurement: Steps of height measurement is described as follows:

1) Have subject remove shoes and hair accessories prior to measurement

2) Have subject stand with his or her back and feet against the wall on a flat floor directly in front of the measuring tape which is center of his or her back

3) Have subject stand with back straight, heels close together, legs straight, arms at sides, and looking straight ahead with head erect

4) Place the square flat against the wall. Lower it until it firmly touches the crown of the head with sufficient pressure to compress the hair

5) Hold the square steady and have subject move out from under the square

6) Read the measurement at eye level where the lower edge of the square intersects the measuring tape

7) Read to the nearest 1 centimeter the measure and record

**5. Self-management theory**

Self-management is widely recognized as a necessary method for maintaining and improving patient's health behavior and health status (Dongbo et al., 2003). The self-management method has been broadly used in chronic illness which involves perception, response, monitoring and prevention of symptoms, drug use, management of emergency state, dietary control, exercise, smoking control, stress management, interaction with health team, information management, adaptation to work, interpersonal relations, and psychosocial response to their illness and emotion (Clark et al., 1991). The goal of self-management is to diminish the morbidity and mortality rate, and improve the quality of life (Tobin et al., 1986). The review of related literature found several definitions of self-management as follows:

**5.1 Definition of self-management**

The self-management theory had been used in chronic illness. The review of related literature found several definitions of self-management as follows:

Tobin et al. (1986) defined self-management as a protective action or performance of therapeutic activities for health care that aims to promote self-control. In their definition, the final goal of self-management is to reduce morbidity and mortality rate, and to promote quality of life.

Creer (2000) described self-management as a procedure where patients change some aspects of their own behaviors. Successful mastery and performance of self-management strategies results in changes in the mortality and morbidity indices of the disease, improvement in the quality of life of patients and families, and development of self-efficacy in that they could contribute to the management of their disorder. They became partners with healthcare providers in controlling chronic disease or disorder.

Clark et al (1991) defined self-management as the daily activities an individual must engage in to control or decrease the impact of disease on health status, which includes contending with the psychosocial difficulties caused or intensified by the disorder.

Kanfer and Gaelick-Buys (1991) defined self-management as the process of self-control and monitoring of change behavior on the basis of cognitive process and learning from past experience. The obtained information is then evaluated to make decision in response or to induce the desired behavior.

As mentioned above, self-management was described as individual's abilities, accepts their conditions, understand their situation, and takes responsibility to manage and control the effect of disease on health status. It described as the process of self-control monitoring of change behaviors based on cognitive process and learning about their illness and manage them from their past experience by using the cognitive and behavioral skills. Clients who understand their conditions, they seem to perform their own appropriate health behaviors for controlling and managing their illness with a good relationship between the clients and the health care providers. The collaboration between patient and health care provider is a partner with supporting from family and social resources. All of these activities of

self-management aims at control or decrease the impact of disease on health status, monitor and manage their conditions, induce the desired behavior, promote self-control, and improve health status.

### 5.2 Theoretical underpinning self-management

Self-management was an assessment of one's own knowledge, skill, and abilities. Self-management well defined and realistic personal goals, monitoring progress toward goal attainment and being motivated through goal achievement, and responding to feed back. It must undertake as the day to day tasks by an individual to 1) control or reduce the impact of disease on physical health status; 2) cope with the psychosocial problems generated by chronic disease; and 3) manage daily living according to their financial and social conditions (Barlowet al., 2002).

There were two theoretical frameworks underlying the self-management concept including self-control and self-regulation (Creer, 2000; Kanfer & Gaelick-Buys, 1991) as follows:

#### 5.2.1 Self-control

Self-control was the concept that postulates that personal control, a locus of control (LOC), is either internal or external (Rotter, 1966). Moreover, LOC was described as a general principle that a person's attempt to control their personal environment was influenced by internal or external factors. Control was generally defined as "the perceived ability to significantly alter events" (Burger, 1989).

Kanfer and Gaelick-Buys (1991) used the term self-control for a person's actions in a specific situation, rather than as a personality trait. Moreover, they describe self-control as the probability behavior of the response to a situation. Self-control was a cornerstone in the goal orientation of self-management training. The indicator of success of self-management training was a restoration of self-control; therefore self-control was clearly a matter of central focus in the self-management concept (Creer, 2000; Nakagawa-Kogan, 1996). Clients must had self-control that was, the belief in their capability to perform these strategies to reach the goals (Creer and Holroyd, 1997).

**5.2.2 Self-regulation**

Self-regulation refered to self-generated processes that were planned and cyclically adapted in an attempt to control personal, behavioral, and environment factors (Clark et al., 1991; Zimmerman, 2000). Self-regulation was also defined by Maes and Karoly (2005) as a goal-guidance process aimed at the attainment and maintenance of personal goals. The self-regulation process requires self-observation, self-judgment, and self-reaction. Self-regulatory processes encouraged individuals to learn the strategies to manage their disease (Clark and Zimmerman, 1990).

Self-regulation addressed adaptive and maladaptive states. In maladaptive states, clients needed the necessary self-regulatory strategies to achieve adaptive states. Therefore, the major goal of these clients was adaptation. The three aspects of adaptive systems that persons employed as a means to coping with maladaptive states including learning, regulation of arousal, and maintenance of an organized conceptual system. Self-regulation was also defined as a goal-guidance process aimed at the attainment and maintenance of personal goals (Maes and Karoly, 2005), and its processes encouraged individuals to learn the strategies to manage their disease (Clark & Zimmerman, 1990).



To develop self-management, a person needed to use self-regulation process which was characterized by three distinct stages including self-monitoring, self-evaluation, and self-reinforcement (Kanfer, 1980; Kanfer and Goelick-Buy, 1991). The context of this study related to self-management method proposed by Kanfer and Goelick-Buy (1991), three distinct stages of self-regulatory process were used to guide to conduct the self-management promotion program in the study. They were described as follows:

**1.) Self-monitoring** involved deliberately attending to one's own behavior. Self-monitoring could also increase client motivation for change. Baseline data, collected before treatment implementation, could provide and encourage future change. The achievement of a criterion could be graphically displayed and could provide a visual guide for the administration of reinforcement, by the therapist

and by the client. The finding of favorable behavior change could result when another person monitors the target behavior. Change could not occur if person lacked standards for a given behavior or if there was no discrepancy between standards and monitored behavior. Self-monitoring tasked that emphasized negative effects of a target behavior could also increase reactivity.

For establishing self-monitoring in individual programs, both client and health care provider should clearly specify the class of behaviors to be observed and should discuss examples to illustrate the limits of the class. If the goals of self-monitoring were to motivate behavior change, selection of time periods would invoke consideration of the intervals in which change most easily occurred. The health care provider should discuss with the client the recording method. Self-monitoring could serve as an important program component and motivation device.

**2) Self-evaluation** consisted of a comparison between the information obtained from self-monitoring and the person's standard for the given behavior. It involved a comparison between what one was doing and what one ought to be doing. Self-evaluation based on inappropriate or insufficient self-monitoring or on a vague and unrealistic standard interfered with effective self-regulatory behavior, because the comparison had not yield an effective guide for corrective action.



**3) Self-reinforcement** referred to the person reacted cognitively and emotionally to the results of the self-evaluation. These reactions had both feedback effects, affecting the strength of the preceding behavior, and they had feed forward effects, influencing the client's expectations and behavior on future occasion. Positive self-reinforcement, or self-reward, was most commonly used in self-management programs and had been the focus of most research. Aversive self-reinforcement delivered in from of self-criticism, self-punishment, or withholding of positive self-reinforcement.

*Positive self-reinforcement or self-reward* included symptomatic and material; inquiring about luxury items that the client would like to acquire; and

obtaining verbal statements that would express self-satisfaction frequently yield suggestions for appropriate self-reward.

Negative self-reinforcement or self-generated aversive consequences were classified into two types including self-punishment and negative self-reinforcement. These two sets of operations differed in that self-punishment was aimed at interrupting or decelerating a response, whereas negative reinforcement was aimed at increasing a response that serve to terminate or avoid an unpleasant stimulus. Self- punishment was the use of an aversive conditioned reinforce in the though stopping technique. Self-punishment could also involve the removal of a positive stimulus following an undesirable behavior.

According to self-management method, self-management could help the client acquire more effective interpersonal, cognitive, and emotional behaviors, alter client's perceptions and evaluative attitudes of problematic situations, and either change a stress-inducing or hostile environment or learn to cope with it by accepting that it was inevitable. And, self-management focused on goal and collaborates with healthcare providers (Kanfer & Gaelick-Buys, 1991).

**6. Self-management intervention in chronic disease to reduce blood pressure or body mass index**

This section reviewed the evidence of existing interventions which were applied the self-management model in chronic disease to reduce blood pressure or BMI both Western and Thailand as follows:

Bosworth et al. (2009) studied a behavioral intervention (bimonthly tailored nurse-administered telephone intervention targeting hypertension-related behaviors) home blood pressure monitoring three times weekly, or the behavioral intervention plus home blood pressure. The results showed that combined home blood pressure monitoring and tailored behavioral telephone intervention improved blood pressure control, systolic blood pressure, and diastolic blood pressure at 24 months relative to conventional care.

McManus et al. (2010) studied a randomized controlled trial of telemonitoring and self-management in the control of hypertension. Self-management of hypertension using a simple drug titration plan in combination with telemonitoring of blood pressure resulted in significant reductions in systolic blood pressure at 6 and 12 months compared with usual care. From baseline to 12 months, systolic blood pressure decreased by 17.6 mmHg (14.9–20.3) in the experimental group and by 12.2 mmHg (9.5–14.9) in the control group.

Lee et al. (2011) studied a quasi-experimental of self-management program for obesity control among middle-aged women in Korea. The self-management group received intervention that included walking at a convenient time and place, keeping healthy dietary habits, group workshops, phone counseling, and mobile phone short message services. The structured exercise group received a structured exercise intervention, which involved three 1 hour walking classes per week at the health center. Both groups received baseline assessments before starting the interventions and at 12 weeks. After 12 weeks, there were significant changes in the health behavior, amount of body fat, and blood pressure of the participants in both groups, but there was no significant difference in their body composition, blood profile, or blood pressure. Although the difference was not significant, the satisfaction level of the self-management group was 12.0% higher than that of the structured exercise group.

Pakdevong and Pongprapa (2012) studied effects of self-management program on health behavior, body weight, body mass index, and waist circumference of persons at risk of type 2 diabetes. The 12-week self-management program consisted of four activities including 1) assessment and planning, 2) training for self-management, 3) self-management in diet and exercise modification practices which consisted self-monitoring, self-evaluation and self-reinforcement according to Kanfer and Guelick-Buys' Self-management model, and 4) Evaluation of the program. This program provided group education regarding diet and exercise, and supported the participants by home visit and telephone call. The results showed that after completion of the program for 1 year, health behavior was significantly better,

whereas body weight, body mass index and waist circumference significantly decreased.

Pamungkas et al. (2015) studied the effect of dietary and exercise self-management support program on dietary behavior exercise behavior and clinical outcomes in type 2 diabetes mellitus. The experimental group received the dietary and exercise self-management support program within 8 weeks including individual education and counseling session by using lecture, discussion, weekly telephone follow-up, brief counseling, and face to face follow-ups. The researcher coached the patients to estimate the total calorie based on body mass index and a standard calculation which are 10% protein, 60% carbohydrate, and 30 %fat. For the exercise program, the researcher demonstrated 30 minutes of walking exercise. The results indicated that there were significantly differences in dietary behavior, exercise behavior, fasting blood glucose, cholesterol total level, and systolic blood pressure between the experimental group and control group. However, for the BMI and diastolic blood pressure were no significant differences between two groups.

Songthai et al. (2014) studied the effectiveness of peer-support, self-management program on the self-management behavior and blood pressure of older adults with essential hypertension within 16 weeks. Eighty-one older adults with hypertension were randomly assigned to two experimental groups and one control group of 27 older adults each. The experimental groups were peer-support and self-management at the fourth and sixteenth week after completing a peer-support, self-management program, participants in the two experimental groups demonstrated statistically significant improvements in self-management behavior and reduced blood pressure that were also significantly different from those of the control group.

Thutsaringkarnsakul et al. (2012) studied the effects of self-management program on blood pressure control in hypertensive patients at risk for stroke. ^he intervention group attended four phases; problem assessment, need identification, preparation for self-management, practice for self-management, and evaluation self-management phases. The control group were received the personal information. The outcome of this study was blood pressure control which was measured at baseline

and monthly over three months. At three months the percentage of participants maintaining blood pressure control was significantly greater in the intervention group compared with the control group.

Wattanakul et al. (2013) studied learning program for self-management on diet and exercise of persons with prehypertension, Burirum province. The experimental group participated in the self-management program on diet and exercise for blood pressure control. The program lasted for 10 weeks. For the comparison group, the routine health education program had been implemented for this group. The results showed the experimental group had the significantly increased levels of knowledge, self-efficacy to do self-management, outcome expectation of practicing self-management, and self-management behaviors on diet and exercise for blood pressure. Besides, blood pressure level of the experimental group was found to decrease significantly comparing to before the experimentation and the comparison group.

Based on the research results, the self-management program were applied in various setting being at hospital and home. The self-management method had a beneficial to change health behaviors and health outcomes including systolic blood pressure, diastolic blood pressure, and BMI. The results of these studies revealed that self-management method could increase knowledge, self-efficacy, self-management behavior, improve health behaviors, and to reduce blood pressure and BMI. The self-management studies in chronic disease indicated that it had effective method and it should be applied to guide the intervention to reduce blood pressure and BMI.

**7. Interventions for lowering blood pressure and BMI in persons with prehypertension or obesity**

This section reviewed the evidence of existing intervention for lowering blood pressure and BMI in persons with prehypertension both Western and Thailand. The existing intervention was presented as follows:

Appel et al. (2003) studied effects of comprehensive lifestyle modification on blood pressure control. The participants included prehypertension and hypertension. This study had three intervention groups: (1) established intervention being a behavioral intervention including weight loss, increasing exercise, low sodium intake, and limited alcohol intake; (2) established plus diet approach to stop hypertension (DASH); and (3) an advice intervention as comparison group. The finding showed that both behavioral interventions significantly reduced weight, improved fitness, and lowered sodium intake. The established plus DASH group was a highest of reduction in systolic blood pressure than other groups.

Bavikati et al. (2008) studied effect of comprehensive therapeutic lifestyle changes (TLC) on prehypertension. The TLC included exercise training, nutrition, weight management, stress management, and smoking cessation interventions administered by trained non physician healthcare providers within 6 months. This study was without control group. The results showed that women had greater reductions of systolic and diastolic blood pressure than men. Also, subjects with a baseline BMI <30 kg/$m^2$ had a greater reduction in blood pressure than those with a BMI >30 kg/$m^2$. The participants had blood pressure returned to normal level about 37.7%.

Blumenthal et al. (2010) studied effects of the DASH diet alone and in combination with exercise and weight loss (DASH-WM) on blood pressure and cardiovascular biomarkers. The participants of this study were overweight or obese persons who aged 35 years or older, having prehypertension or hypertension. DASH diet alone group received counseling on the DASH diet and were provided feedback on their adherence to the diet in weekly 30- to 45-minute small group sessions led by the study nutritionist. DASH-WM group received the same instruction in the DASH diet alone group, but their weekly 30 to 45 minutes with small group sessions including self-monitoring strategy, exercise sessions three times per week with a 30-minute of biking, brisk walking, or jogging. The results showed that blood pressure had reduced in the DASH-WM group more than the DASH alone.

Prasertthai, Suwanno, and Sonpaweeravong (2010) studied a randomized controlled trial (RCT) regarding effect of a home-based moderate intensity exercise on the reduction of blood pressure in persons with prehypertension. The participants were randomly assigned to an exercise group (n = 30) and a non-exercise group (n = 30). The exercise group performed home-based moderate intensity exercise at least three times per week, with a duration of 30-45 minutes, for four weeks. Type of exercise was selected based on their design including brisk walking, jogging, stick exercise, or biking. Moderate intensity exercise was determined by a target of 60-70% maximum heart rate. Blood pressure evaluated at 1st, 2nd, 3rd, and 4th week. The finds showed that both systolic and diastolic blood pressure of the exercise group was significantly reduced and lower than the non-exercise group. Blood pressure had reduced after engaging the program at 3rd week.

Wongsombat & Preechawong (2010) conducted effects of health promoting self-efficacy program on waist circumference, BMI, and blood pressure of overweight adults based on self-efficacy theory. The inclusion criterion was blood pressure in prehypertension. The results showed that effectiveness between Chi-gong and walking significantly reduced SBP, DBP, and BMI but they had no the different changes of SBP, DBP, and BMI between participants in Chi-gong and walking exercise.

Poosalee and Preechawong (2014) studied the effect of the health promoting program with Thai boxing aerobic dance on blood pressure and BMI in persons with prehypertension. The participants were prehypertension and overweight. The experimental group participated in the health promoting program with Thai boxing aerobic dance. A target intensity exercise was 60-70% maximum heart rate. The 10-week program consists of health education on behavioral modification, practice on Thai boxing aerobic dance, and motivation. The program provided education session by booklets, VCD of Thai boxing aerobic dance. The findings showed that after participating in the health promoting program, the experimental group had significantly decreased in mean systolic blood pressure, diastolic blood pressure, and body mass index decreased. The mean systolic blood pressure, diastolic blood

pressure, and BMI in the experimental group were also significantly lower than those in the control group.

Sales et al. (2012) investigated the effect of diet and exercise training on blood pressure in ten women with prehypertension with BMI in range of 18.5-29.9 $kg/m^2$ for 12 weeks. The findings showed that systolic blood pressure in experimental group decreased, which compared with pre-intervention and control group ($p<0.05$), but it had no effect on diastolic blood pressure. Moreover, participants, who received program, had decreased BMI after program.

Song and Nam (2015) studied effectiveness of a stroke risk self-management intervention for adults with prehypertension. The participants were recruited from community centers in two urban areas. The program consisted of three weekly, two-hour, face-to-face sessions and two booster telephone sessions. The principal aim of the intervention was to increase stroke risk awareness and motivation for behavioral change to maintain self-management for stroke risk factors. This program provided by nurse in community health care and included a small group meeting, individual counseling, and phone counseling. The control group received a 60-minute session on stroke prevention using a supplemental pamphlet which contained information from the Korean Stroke Society web links. This study found significant improvements in the experimental group for stroke risk awareness, blood pressure self-monitoring, regular physical activity, and sustainable behavior over time.

For the conventional care for persons with prehypertension and obesity, the model of seven ball colors was used to primary screening of hypertension and treatment. The treatments for persons with prehypertension and obesity were assessment of risk behaviors, mass health education regarding eating, exercise, emotion, stop smoking, and stop alcohol drinking (Health Education Division, 2013). This service was provided by nurse in community.

Under the Universal Health Care Coverage Scheme in Thailand, the Ministry of Public Health (MOPH) launched policy for health promotion and disease prevention to primary care unit (PCU) that provided primary care or the basic health care to

people in catchment area To provide this service, nurses in PCU were the key leaders in integration of services for quality of care including hypertension prevention. Persons with prehypertension were known as a risk group of hypertension. Therefore, hypertension prevention in this population was important nursing role and it challenged nurse in community to promote people performing healthier behaviors (Health Education Division, 2013).

In summary, the interventions for persons with prehypertension and obesity were reviewed. These interventions were delivered in a variety with the most popular being hospital and the participant's home. The participants of previous studies were combined with prehypertension and hypertension, or they were combined with overweight and obesity. The intervention approaches were group based, individual approach, or a combination of both. In addition, components of the intervention were broadly identified as DAHS diet, healthy diet, type of exercise, intensity of exercise, emotion, stop smoking, and stop alcohol drinking. The outcomes of interventions were focused on improvement of health behaviors, blood pressure, BMI, or combination with all outcomes. There was one intervention focusing on awareness of the participant. It focused on risk of stroke, not risk of hypertension.



Thus, the self-management promotion program (SMPP) of this study focused on persons with prehypertension and obesity. The aims of the intervention were to increase hypertension awareness, knowledge, and motivation for behavior change to maintain self-management skills to reduce blood pressure and BMI. The program was delivered both clinical and home setting. The content of knowledge emphasized risk of hypertension, healthy diet eating, exercise for prehypertension and obesity following JNC 7 guideline, ACSM's guideline, and existing knowledge (Chobanian et al., 2003; Kaminsky, 2014). The strategies were combined multi-components including group education, group discussion, demonstration and return demonstration, telephone call, and home visit. In addition, the program cooperated between the participants and researcher as the supporter and assistant to promote the achieving their goal.

# CHAPTER III

# METHODOLOGY

This chapter describes the research methodology applied in this study including research design, setting, population and sample, sample selection, research instrument, protection of the rights of human participants, data collection, and data analysis

## Research design

The study was quasi-experimental with a two group pretest and posttest design (Burns & grove, 2009). The design was used to examine effects of the self-management promotion program (SMPP) on blood pressure and body mass index (BMI) among persons with prehypertension and obesity. The outcomes were blood pressure and BMI. The participants in the experimental group received the SMPP and conventional care while the participants in the control group received conventional care. Data was gathered after participants consented to participate in the study and the 12th week after completed the program. The research design of the study was showed in Figure 2.



| | | | |
|---|---|---|---|
| Experimental group | $O_1$ | X | $O_2$ |
| Control group | $O_3$ | | $O_4$ |

12 weeks

**Figure 2** Research design

Remark

| | | |
|---|---|---|
| X | = | Self-management promotion program (SMPP) |
| $O_1$ | = | SBP, DBP, and BMI in experimental group at baseline |
| $O_2$ | = | SBP, DBP, and BMI in experimental group at the $12^{th}$ week |
| $O_3$ | = | SBP, DBP, and BMI in control group at baseline |
| $O_4$ | = | SBP, DBP, and BMI in control group at the $12^{th}$ week |

**Setting**

This study was conducted in the community Nakhonpathom province which located in the central region of Thailand. Nakhonpathom comprised seven districts: 1) Mueng Nakhon Pathom, 2) Kamphaeng Saen, 3) Nakhon Chai Si, 4) Don Tum, 5) Bang Len, 6) Sam Phran, and 7) Phutthamonthon. Bureau of Non-Communicable Disease (2015) reported that the morbidity rate of hypertension had increased significantly between 2011 and 2015 from 1,913.10 to 2,316.15 patients per 100,000 population. In addition, the mortality rate of hypertension had also increased from 4.05 to 10.39 deaths per 100,000 population over the same period.

The Phuthamonthon district was specifically selected for consideration in this study. Between 2014 and 2016, the incident rete of hypertension had increased with approximately 34%. Consistently, mortality rate of coronary heart disease was highest rate in Phuthamonthon by 71.98 deaths per 100,000 population (Bureau of Non-Communicable Disease, 2014, 2016). Moreover, Phuthamonthon Community Hospital was a good representative for chronic care services. It consisted of five primary care units (PCU) and each one provided screening for hypertension among population in each catchment area. Finally, Mahasawat and Klong Yong1 PCUs were randomly selected to represent PCUs as shown in Figure 3.

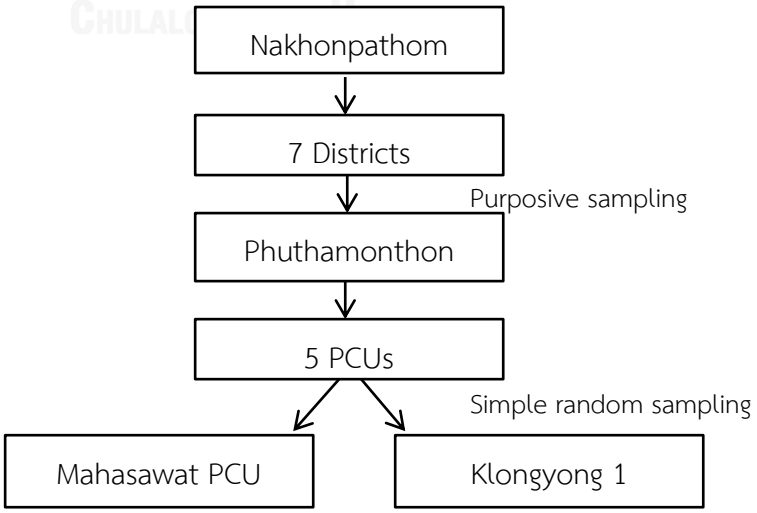


**Figure 3** The study setting

## Population and sample

### Population

Population of study was adults aged 35-59 years with prehypertension and obesity based on the blood pressure classification by the Seven Report of National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC7) (Chobanian et al, 2003) and BMI classification by World Health Organization (WHO, 2000).

### Sample

The sample of this study was persons with prehypertension and obesity aged 35-59 years living in catchment area of Mahasawat and Klongyong1 PCUs, Phuttamonthon Nakhon Pathom, Thailand.

### Sample selection

The participants were purposively selected based on their eligibility. The researcher first reviewed health assessment records and reassessed their blood pressure and BMI to determine whether the participants were eligible. Prospective participants fulfilling all of the following criteria were invited to participate in this study.



### Inclusion criteria

1) Aged 35-59 years both male and female
2) Blood pressure of 120-139 and/or 80-89 mmHg
3) BMI 25 $kg/m^2$ and higher
4) No antihypertensive medication treatment
5) Being able to communicate, read, and write Thai language
6) Willing to participate in the program

### Exclusion criteria

The participants who did not complete the program were excluded.

**Sample size**

The sample size of this study was concerned based on the power analysis and effect size determinations. The significance criteria was set =.05, power = .80 based on the accepted value of power. Most nursing studies could not expect effect sizes in excess of 0.50 as medium effect size (Polit & Beck, 2008). Giving a medium to large effect size, 30 participants per group would be sufficient for a comparison of differences between the experimental and control groups by using the independent t-test (VanVoorhis & Morgan, 2007). In addition, an attrition rate of 10% was anticipated. Therefore, the participants of the experimental and control groups needed for this study should be 33 participants in each group.

**Sampling procedure**

Simple random sampling was used to select two PCUs in Phutthamonthon district, Nakhonprathom province. The selected PCUs providing service for chronic care services were Mahasawat and Klongyong 1. Then, one PCU was allocated to the control group and the other was allocated to the experimental group using simple random sampling by drawing lots technique. Mahasawat was assigned as the control group while Klongyong1 was assigned as the experimental group. The researcher reviewed the data on screening for hypertension in 2015 to 2016 both PCUs. Persons with prehypertension and obesity who were identified according to the review of their data record were 49 persons in Mahasawat PCU and 57 persons in Klongyong 1 PCU. The researcher repeated blood pressure, body weight, and height before conducting the program. The participants who met the inclusion criteria were 42 persons in Mahasawat PCU and 49 persons in Klongyong 1 PCU. Simple random sampling by using a drawing lots technique was used to select sample for 33 persons in each groups. Eligible participants who met the inclusion criteria were invited to participate in this study. Two participants in the experimental group refused when approached to obtain informed consent by the researcher. The researcher selected other participants who met inclusion criteria until completed the total number in this group. Details of the sampling procedure were shown in Figure 4.

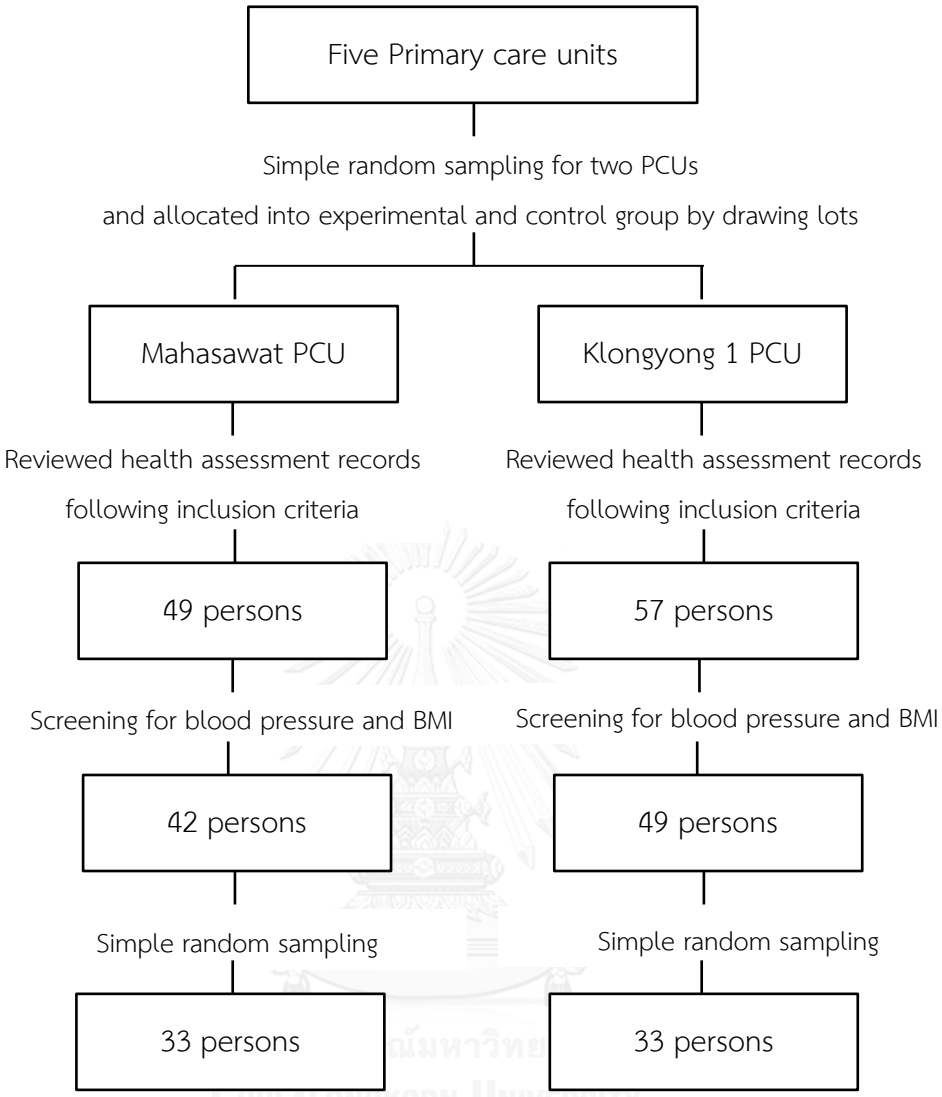


**Figure 4** Flow diagram of the sampling procedure

**Research Instruments**

The research instruments in this study comprised three types: 1) data collection instruments, 2) intervention instruments, and 3) instruments for monitoring experiment. The content validity of all instruments was reviewed by five experts including (1) a physician who was expert in community medicine; (2) a nurse instructor who was advanced practice nurse and expert in community and home care for chronic illness; (3) a nurse instructor who was expert in chronic illness and cardiovascular disease; (4) a nutrition instructor who was expert in food nutrition and dietetics; and (5) an instructor who was expert in exercise physiology (Appendix F).

**1. Data collection instruments**

Instruments for data collection comprised 1) Personal information sheet, 2) Instrument for blood pressure measurement, 3) Instrument for body weight measurement, and 4) Instrument for height measurement.

**1.1 Personal information sheet**

The personal information sheet that was developed by the researcher and consisted of three parts:

1) Section for demographic data included gender, age, marital status, educational level, occupation, family history of hypertension, and health conditions.

2) Section for health information related to hypertension consisting of blood pressure, body weight, height, body mass index, and present illness.

3) Section for health risk behaviors for hypertension consisting of diet eating, exercise, smoking, and alcohol drinking.

**1.2 An automated sphygmomanometer** (Omron model HEM-7130)

Blood pressure measurement was the basis for the diagnosis, management, and treatment of high blood pressure. Recently, the automated sphygmomanometer was recommended to use in blood pressure measurement in hospital and primary care (Chobanian, et al., 2003; O'Brien, 2003; National Heart Foundation of Australia, 2016). A standard automated sphygmomanometer (Omron model HEM-7130) was used for measuring systolic and diastolic blood pressure in this study. Calibration of

the blood pressure device was tested for accuracy by the manufacture company. The blood pressure monitor cuffs were medium size (22-32 centimeters) and large size (32–42 centimeters). The cuffs were calibrated from the OMRON Company before using in this study. The report of calibration for this device informed that the manometer failure rate of less than 0.5% (Canzanello, Jensen, & Schwartz, 2001). Validation of the blood pressure monitor was undertaken following the Association of Medical Instrumentation (AAMI) protocol and accuracy of measurement was pressure $\pm$ 3 mmHg (Omron Company) that met the AAMI acceptance.

Precision was similar to reliability and was supported by careful and proper use of the equipment (Rodrigues, 2007). Thus, prior to initiating participants monitoring, nurse prepared equipment and performed following a standard protocol of the JNC7 (Chobanian et al., 2003), the European Society of Hypertension (ESH), and European Society of Cardiology (ESC) guidelines (Mancia, et al., 2013). Moreover, the research assistant was trained to use the automated sphygmomanometer following the blood pressure measurement protocol of the study developing based on the JNC7, ESH, and ESC guideline. After training, the research assistant demonstrated blood pressure measurement and record in systolic and diastolic blood pressure compared with researcher. The results showed that measurement was not different more than 10 mmHg between research assistant and researcher.



The process for obtaining the blood pressure was participant preparation and clinical measurement technique as follows:

*1) Participant preparation*

The participants were instructed to abstain from drinking both caffeine and alcohol containing beverages, exercise, and tobacco used within 30 minutes before the blood pressure measurement. In clinic, the participants were seated comfortably with their back supported and both feet lying flat on the floor for at least 5 minutes in a quiet room, and bared the upper arm without thick clothing. Next, the participants were informed to stop moving and talking during the measurement.

*2) Clinical blood pressure measurement techniques*

Before conducting the program, the research assistant was trained to use the automated sphygmomanometer following the blood pressure measurement protocol of the study developing based on the JNC7, ESH, and ESC guideline. After training, the research assistant demonstrated blood pressure measurement and record in systolic and diastolic blood pressure compared with researcher. The results showed that the measurement was not different more than 10 mmHg between research assistant and researcher.

For blood pressure measurement techniques, blood pressure measurements were collected and recorded by the research assistant at baseline and at the $12^{th}$ week. A standard bladder of the cuff in range of 22-32 centimeters (cm) encircled at the upper arm circumference, but had a larger cuff available for large arm circumferences (32-42 cm). The arm was supported at heart level in the sitting position. At initial visit, blood pressure was checked in both arms at the first measurement. The arm with the higher blood pressure had been used for continuing blood pressure monitor. At the $12^{th}$ week, two measurements of blood pressure on the same arm side in the first measurement were taken, and the average of those readings was recorded to represent the participant's blood pressure.

In this study, the total participants in this study were 65. A standard cuff for blood pressure measurement was used for 41 participants (27 participants in the experimental group and 14 participants in the control group). A large cuff was used for 14 participants (six persons in the experimental group and eight persons in the control group).

**1.3 A digital weight scale** (Omron model HBF-214)

This study used the digital weight scale for measurement of body weight (Omron model HBF-214). Calibration of the weigh scale device was tested for accuracy by the manufacture company. The report of calibration for this device informed that the accuracy of instrument was $\pm$ 0.4 kilogram (kg) for body weight in range of 2.0 kg to 40 kg, and it was $\pm$ 1% for body weight in range of 40.0 kg to 150.0 kg. Before using data collection, the scale was tested to ensure accurate

measurement by checking with the standard weight with 5 kg (Department of Health and Social Services, 2012). The weight reading was recorded. If the recorded weight was more than 0.2 kg higher or lower than the standard weight, the measurement would be repeated. The result of checking accuracy showed that the weight reading was not different more than 0.2 kg compared with the standard weight. Thus, the digital weight scale was used to measure body weight in this study.

Body weight was measured by the research assistant. The research assistant was trained to use the digital weight (Omron model HBF-214) following the protocol before conducting the program. After training, the research assistant demonstrated weight measurement and record compared with researcher. The results showed that the measurement was not different more than 0.2 kg.

The process for obtaining the body weight including participant preparation and clinical weight measurement techniques was as follows:

*1) Participant preparation*

The participants were asked to empty their pockets and remover all jewelry or other objects. Then, the participants were asked to remove as much outerwear as possible and their socks and shoes before stepped on the scale. One measurement of weight was taken on each participant.

*2) Clinical weight measurement techniques*

At beginning of each measurement day, weight scale was turn on to zero scale before the participant stepped onto the scale. A known weight was placed in the center of the scale. If the scale reading was different for 0.2 kg either higher or lower than the known weight, the measurement was repeated until scale was accurate. Participants were informed that arms hang freely by the sides of the body and palms toward thighs; head was up and eyes looked straight ahead.

**1.4 The Portable Stadiometer** (Health o meter model 402KL)

This study used the portable stadiometer for measurement of height (Health o meter model 402KL). Calibration of instrument was tested for accuracy by the manufacture company. The portable stadiometer was tested to ensure accurate

measurement by checking with the standard height rod of 150 centimeters (cm) (Department of Health and Social Services, 2012). Two measurements were required in order to reduce error and obtain a more accurate measurement. If the difference between the two height measurements was greater than 2 cm, the measurement would be repeated. The result of checking accuracy showed that the high measurements were not different more than 0.2 kg compared with the standard height. Thus, the portable stadiometer was used to measure height in this study.

The process for obtaining the height including participant preparation and clinical height measurement techniques was as follows:

1) Participant preparation

The participants were asked to remove his or her socks and shoes before step on the portable stadiometer. The participants were informed that one measurement of height was taken.

2) Clinical weight measurement techniques

The participants were asked arms hang freely by the sides of the body, palms facing the thighs; legs were placed together, bringing knees or ankles together; head was up and facing straight ahead. Then, headpiece was brought down onto the upper most point on the head and compressed the hair. Height was recorded.

**2. Intervention instruments**

The intervention instrument for this study was the self-management promotion program (SMPP). The instrument was described into three sessions (1) program development, (2) program trial, and (3) the program modification.

**2.1 Program development**

In Thailand, primary care unit (PCU) was the first level of contact of individual, family, and community with the health system serving health care as close as possible to where people lived. Nurse was a key person in PCU. Health promotion and disease prevention were the cornerstone of nursing role that focused on changing the behaviors of individual with respect to their health. The existing nursing care for persons with prehypertension focused on providing health education

about eating, exercise, emotion, and reducing tobacco, and alcohol (Health education division, 2013). Although, there was nursing intervention to provide health education for persons with prehypertension, the prevalence of prehypertension and the incidence of hypertension had been increased. Previous studies suggested that the intervention programs focused on increasing awareness and modifying risk factors were essential and should be conducted (Badakhsh et al., 2015; Shen et al., 2016).

As the mentioned above, this information was basis for the effective development of the program. The SMPP aimed to enhance participant's knowledge, practice skills, and awareness including motivation for engaging health behaviors change and management of their behaviors leading to reduce blood pressure and BMI. The program provided the knowledge and practice skills to manage health behaviors emphasizing healthy diet eating and exercise through self-monitoring, self-evaluation, and self-reinforcement; and the program also motivated the participants to continuously practice health behaviors through group discussion, telephone calls, home visits. It presumed that persons with prehypertension and obesity who receive the SMPP would have lower blood pressure and BMI than those who receive conventional care. Moreover, persons with prehypertension and obesity who received the SMPP would have lower blood pressure and BMI than before participation in the program.



The SMPP was developed based on self-management method (Kanfer & Goelick-Buy, 1991), clinical practice guidelines for prehypertension and hypertension (Chobanion et al., 2003; Thai Hypertension Society, 2008), and existing knowledge. The program provided the knowledge and practice skills to manage the health behaviors emphasizing healthy eating and exercise that significantly related to blood pressure and BMI. The program comprised three phases that covered the seven sessions of implementation during 12 weeks. The three phases of the program were (1) problem assessment and motivation phase, (2) self-management skill training phase, and (3) self-management practice and monitoring phase. The details of the SMPP were described as follows:

**1) Problem assessment and motivation phase**

The aims of this phase were (1) to develop relationship between researcher and participants; (2) to assess health problem, health behaviors, and experiences; 3) to increase awareness regarding the risk factors for developing hypertension; and 4) to promote participants to accept the health behavior change.

The activities in this phase were cooperated in the first session of this program that began with the assessment and identified the personal data that related to risk health behaviors, hypertension, and obesity. Researcher made the good relationship with the participants encouraged the participant to accept the changing health behaviors, and to encourage the participants to set their goal of health behavior change. The most important in this phase, the participants were encouraged for confidence in their self-management skills and increase awareness of their risk factor related to blood pressure and BMI.

**2) Self-management skill training phase**

This phase comprised three education sessions and one discussion session. The aims of this phase were composed of (1) to enhance knowledge and management skills of the participant for managing health behaviors related to reduce hypertension and obesity risk factors, and (2) to promote the participants for practice of self-management skills and essential skills.



The activities in this phase were cooperated in the second, the third, the fourth, and the fifth sessions of this program which implemented in the first day of program at PCU. Most activities of this phase were emphasized about providing significant knowledge regarding hypertension, risk factor, and health risk behaviors management by using booklets. The participants were also trained and practiced the skills. Researcher supported the participants for observing, recording, and evaluating their health behaviors in the self-management diary record. In addition, research supported the participants to continue for management of health risk behaviors.

**3) Self-management practice and monitoring phase**

This phase consisted of four telephone call sessions and two home visit sessions. The aimed of this phase were (1) To monitor participant's behaviors, (2) to encourage participant applying self-management skills to maintain healthy diet eating and exercise, and (3) to support the participants to perform activities following the protocol.

The activities in this phase were cooperated in the sixth and seventh sessions of this program. The sixth and the seventh sessions were implemented at participant's home. The telephone calls were used at the $2^{nd}$, $3^{rd}$, $6^{th}$, and $10^{th}$ weeks. The home visits were used at the $4^{th}$ and $8^{th}$ weeks. The activities focused on the participant's behaviors. Researcher promoted the participants to record their eating and exercise behaviors in the self-management diary, to compare their practice and goal, and to give reinforcement for continuing health behaviors by themselves.

The materials for the SMPP including the program manual and the booklets were described as follows:

1. The program manual (Appendix H) for nurses to conduct the SMPP. The program manual was developed for nurses to give information how to implement the program for persons with prehypertension and obesity. The information included the conceptual framework of the program and all steps for the SMPP implementation, and substance knowledge about hypertension prevention for persons with prehypertension and obesity.

2. The booklets (Appendix I) for persons with prehypertension and obesity were developed by the researcher. It aimed to provide knowledge about hypertension, lifestyle modification, healthy diet eating, exercise, and self-management skills to manage health behaviors for the participants in the experimental group.

**2.2 Program trial**

The program manual and booklets were validated for content by five experts. A physician who had expertise in community medicine; a nurse instructor who had expertise in community and home care as advanced practice nurse (APN); a nurse who had expertise in chronic illness and cardiovascular disease; an expert in food nutrition and dietetics; and an expert in exercise physiology were asked to validate the structure and content of the program related to the theoretical support. The main suggestions from the five experts indicated that 1) the content of the program should include more the technique of self-reinforcement; 2) the session for problem assessment and education session should be short and concise; 3) some of the contents about healthy diet and exercise were difficult and should be revised, 4) the program should consider to evaluated the physical fitness at baseline and the $12^{th}$ week, and 5) the exercise program should be concerned the intensity of exercise. After receiving comments and suggestions, researcher revised the program based on the comments and suggestions from the five experts.

The structure of the SMPP was established to serve as an intervention protocol. The program was tired out on five persons with prehypertension and obesity to consider the feasibility and complexity of the program. To achieve process fidelity of the intervention, the SMPP was implemented only by the researcher that had already been trained in the dietary and exercise course. In addition, the researcher used the program manual for nurses (Appendix H) as a guideline for intervention in order to ensure the same intensity or dosage of the intervention that the participants received. The results of trying out indicated that there was acceptable delivery of the SMPP and the duration of each session were appropriate. Participants mentioned that the session of group discussion should be extended to 60 minutes for sharing experience. In addition, the SMPP was feasible for implementation with this participant group.

**2.3 Program modification**

The expert's comments and the results of trying out the program indicated that the researcher should modify the protocol and content of the program for clear and concise. The problem assessment and education sessions should be eliminated the complicated content such as counting diet calories and counting heart rate during exercise. For group discussion, time of this session should be extended in order to share experience of the participants. As the results of these recommendations, the researcher modified the content of the program and extended time in group discussion sessions. Structure of the SMPP was described in table 5.

**Table 5** Structure of the self-management promotion program

| Phase | Concepts | Session | Nursing activities |
|---|---|---|---|
| 1. Problem assessment and motivation phase | Self-monitoring | Session 1 | • Encourage the participants to assess their health problem and health behaviors, to express and share about their health behaviors and experience about diet control and exercise<br>• Encourage the participants to express and share about health problem and health behaviors |
| | Self-evaluation | | • Encourage the participants to compare health status and health behaviors in the past |
| | Self-reinforcement | | • Promote the participants to encourage themselves for behavior change and set goal |

**Table 5** Structure of the self-management promotion program (Continued)

| Components | Concepts | Session | Nursing activities |
|---|---|---|---|
| 2. Self-management skill training phase | Self-monitoring | Session 2<br>Session 3<br>Session 4<br>Session 5 | • Provide education and train participants to observe and record eating pattern and exercise behavior |
| | Self-evaluation | | • Provide education and train participants for comparing eating pattern and exercise behavior with goal |
| | Self-reinforcement | | • Provide education and train participants for encouraging to continue behavior by positive and negative reinforcement |
| 3. self-management practice and monitoring phase | Self-monitoring | Session 6<br>Session 7 | • Encourage the participants to use diary record to monitor the progression of their behaviors<br>• Use telephone calls and home visits to evaluate the participant practice about self-monitoring<br>- Ask the participants to share their experience about record of eating pattern and exercise behavior<br>- Discuss about the practices for diary record of participants |

**Table 5** Structure of the self-management promotion program (Continued)

| Components | Concepts | Session | Nursing activities |
|---|---|---|---|
| | Self-evaluation | | • Use telephone calls and home visits to evaluate the participant practice about self-evaluation<br>- Ask the participants to share their experience about evaluation and comparison their behavior with goal<br>- Discuss about their practices |
| | Self-reinforcement | | • Use telephone calls and home visits to evaluate the participant practice about self-reinforcement<br>- Ask the participants to share their experience about encourage themselves to continue target behavior by positive and negative reinforcement<br>- Discuss about their practices |

**3. Instruments for monitoring experiment**

The instruments for monitoring the program included 1) self-management knowledge test to prevent hypertension, 2) self-management diary, and 3) physical fitness record.

**3.1 Self-management knowledge test to prevent hypertension**

The purpose of this instrument was to evaluate self-management knowledge regarding hypertension prevention for persons with prehypertension and obesity. It was developed by the researcher based on literature review and the items were created which covered the most important contents. The self-management knowledge test to prevent hypertension included three parts: hypertension, the eating healthy diet, and exercise to lower blood pressure. It consisted of 30 items with a dichotomous answer for choosing: "correct or incorrect" (correct = 1 point, incorrect = 0 point). The total score ranged from 0-30. Higher score represented greater self-management knowledge for hypertension prevention. The content validity was validated by five experts. The content validity index (CVI) of this instrument was 0.90. The internal consistency of this instrument was tested with 30 persons with prehypertension by using the Kuder-Richardson-20 (KR-20) was 0.87.

The self-management knowledge test to prevent hypertension was administered after session of education in order to determine the participants' understanding of healthy lifestyle behaviors. For persons with prehypertension and obesity, the level for passing was established at 80% of the total score in this test (24 out of 30 scores). Participant who not reached this criterion, the researcher explained more in issues that participants could not answer and asked questions to evaluate their knowledge again. This process performed until the participants understood and reached the criterion of test. Finally, all participants in the experimental group met the criterion of test. The results showed the mean score of the participants in the experimental group was 22.97 (SD = 6.06) at pretest and 27.67 (SD = 2.00) at posttest (Appendix K).

**3.2 Self-management diary**

Self-management diary was developed by researcher for the participants in the experimental group to monitor their eating and exercise behavior, and record the goal and achievement of participant through health behaviors management that related to self-monitoring and self-evaluation processes of self-management model (Appendix J). The participants have to monitor their daily self-management at home. This instrument was validated by five experts. The expert suggested that the diet part should be provided proportion of each diet group. Researcher revised the instrument following expert's suggestion for the easiest, most convenience and practical for participants.

The checklist in the self-management diary record was divided into healthy diet eating and exercise behavior parts. The participants had to set goal and evaluate the goal achievement weekly. In addition, they had to check their management both eating diet and exercise. In each part, the participant had to check for setting their goal, activities, result of their behaviors. The participants were asked to monitor themselves according to the checklist in this instrument for 12 weeks after recruitment to the program. Researcher collected this instrument at the $4^{th}$ and $8^{th}$ week to ensure that each participant kept trace with this procedure designed of this study. Moreover, telephone calls were used to remind and encourage the participants to record in this instrument. The criterion was that the participants performed healthy eating and exercise following their goal.

The results showed that the participants performed healthy eating and exercise at least five days per week was 66.67% at the $4^{th}$ week, 87.88% at the $8^{th}$ week, and 100% at the $12^{th}$ week. Although some of participants could performed healthy eating and exercise less than five days per week at the $4^{th}$ and $8^{th}$ week, all the participants achieved their goal for healthy eating and exercise. These results indicated that all participants in the experimental group were not failed to follow this monitoring procedure compared with their goal.

**3.3 Physical fitness record**

Physical fitness record was developed by researcher based on guideline proposed by ACSM (Kiminsky, 2014) and Department of Physical education (Samahito et al., 2013). Physical fitness record was divided into three parts including cardiorespiratory fitness, muscular endurance, and flexibility.

*3.3.1 Cardiorespiratory fitness* referred to the ability to perform large-muscle, dynamic, moderate-to-high intensity exercise for prolonged period (Kaminsky, 2014). It was evaluated by using three minutes step test (Appendix M) designed to measure heart rate response during cardiovascular activity. This test was required that the individual participant step up and down on a 12-inch high step for three minutes. At the end of three minutes, each individual stop and then his or her pulse was measured. Finger pulse oximeter (PC-60B1) was used to obtain data of pulse rate at the end of step up and down. The accuracy of pulse rate was +2 beat per minute or +2%. Pulse rate was precisely tested by BIO-TEK pulse oximeter simulator.

*3.3.2 Muscular endurance* referred to the ability of a muscle group to execute repeated contractions over a period of time (Kaminsky, 2014). It was evaluated by using the 60 seconds chair stand test (Appendix M). Participants sat in the middle of chair with feet flat on the floor, their arms was crossed, and held close to the chest, to a full stand and return to a complete sitting position for 60 seconds. The score was the total number of standing ability within 60 seconds.

*3.3.3 Flexibility* referred to the ability to move a joint through its complete range of movement. It was evaluated by sit and reach test (Appendix M). The flexibility of the lower back and hamstrings was measured by digital anteflexion meter (model T.K.K. 5403: Takei Scientific Instruments Co., Ltd, Tokyo, Japan). The participants sat on the floor with legs extended by against the testing box, kept their knees extended, placed hand over hand, and slowly reached forward as far as possible along the measuring board. Two practices were conducted and the highest score was recorded in the centimeters.

The criterion was the participants had better physical fitness or had physical fitness at least in fair level. At the 12th week, all participants (100%) had improved muscular endurance and flexibility in fair level and higher. More than two third of the participants (78.79%) had improved cardiorespiratory fitness in fair level and higher; and there was no cardiorespiratory fitness in very poor level. Improvement in physical fitness was associated with exercise (Kaminsky, 2014). These results implied that the participants preformed continuously exercise following the program protocol leading to improve in physical fitness.

**Experimental procedure**

**1. Preparation phase**

**1.1 Instrument preparation**

The manual of the SMPP, materials of the program, and all instrument developing by researcher were proved the content validity by five experts.

**1.2 Place preparation**

Researcher informed the director of district public health office and the chief of the primary care unit. The objectives, procedures, and the approximately length of time for data collection was informed. Additional, researcher also prepared the living room or meeting room for the self-management implementation.

**1.3 Research and research assistant preparation**

Researcher, who had experiences for caring patients with chronic illness, practicing hypertension prevention and health promotion in community, was trained and practice about risk health behaviors management including exercise prescription and dietary control before conduction the intervention. Exercise prescription was trained by the exercise physiology specialist in cardiopulmonary rehabilitation, Faculty of Sport Science, Chulalongkorn University. Healthy diet eating was trained by the experts in nutrition and dietetics.

This study had one research assistant who was the community health nurse with the experiences for caring the patients with chronic diseases in the community for 15 years, and had the certificated in nurse practitioner program. The

research assistance's role was obtaining the pretest and posttest data in both the experimental and control groups. Prior to the implementation of this study, the research assistant was described, discussed about all of the instruments those were used for the correct understanding and obtaining the significant data for pretest and posttest. In addition, research assistant were trained and practiced to use those instrument until had the accurately and reliability prior to the implementation as described in data collection instrument sessions.

**2. Implementation phase**

**2.1 Procedures in the control group**

The participants in the control group were provided the conventional care by community health nurse at the first meeting, and also were given a booklet similar to the participants in the experimental group. The content of the booklet were hypertension, healthy diet, and exercise.

**2.2 Procedures in the experimental group**

Participants in the experimental group were received the SMPP which comprised three strategies of self-management method including self-monitory, self-evaluation, and self-reinforcement. This program composed three phases including 1) problem assessment and motivation phase, 2) self-management skill training phase, and 3) self-management practice and monitoring phase which covered seven sessions of implementation for 12 weeks. All activities of this program were implemented into seven sessions that can be described as follows:

**Session 1**: Problem assessment and motivation

**Time:** 30 minutes, the first meeting day (the recruitment day)

**Place:** the meeting room in primary care unit

**Purpose:** 1) to develop relationship between researcher and participants; 2) to assess health problem and health behaviors; 3) to increase awareness regarding the risk factors for developing hypertension; and 4) to promote participants to accept the health behavior change.

**Activities:** During initial meeting, researcher made the relationship with participants, and explained about the program and role of

researcher and research assistant. Then, participants were assessed health, health behaviors that related to hypertension, physical fitness, blood pressure, body weight, height, and body mass index. In this session, the participants were encouraged to assess their health problem and health behaviors, to express and share about their health behaviors and experience about diet control and exercise. The researcher motivated the participants to change their behavior and helped participants to set goal of their eating behavior and exercise.

**Session 2**: Hypertension education

**Time**: 30 minutes, the first meeting day

**Place:** The meeting room at primary care unit

**Purpose:** To enhance knowledge of the participant about hypertension including type, risk factors, sign and symptom, complication, and treatment of hypertension

**Activities:** The participants were assessed their previous knowledge about hypertension. The participants received the booklet of hypertension. The researcher provided knowledge about hypertension including type, risk factors, sign and symptom, complication, and treatment of hypertension by using booklet and a small group education. The researcher discussed and asked about hypertension. After providing education, all participants were evaluated by using self-management knowledge test to prevent hypertension. The participants had to get a score that passed the criterion (80% of the full score of knowledge test). In the case that they could not meet this criterion, the researcher explained more about the issue that the participant could not answer and led him/her to answer again. Finally, all participants met the criterion of the test.

**Session 3**: Healthy diet education and training

**Time**: 30 minutes, the first meeting day

**Place:** The meeting room at primary care unit

**Purpose:** 1) To enhance knowledge and skills in healthy diet; 2) to practice diet selection; and 3) to practice self-management skills for eating behavior

**Activities:** The participants were assessed their previous knowledge about healthy eating diet by using self-management knowledge test to prevent hypertension. The participants received the booklet of healthy diet, self-management diary, rice-serving spoon, and lunch box. The researcher provided knowledge about healthy diet for persons with prehypertension and obesity including weight loss, daily calories needs, the Thai food guide (Nutrition Flag), number of serving in each diet group, Diet Approach to Stop Hypertension (DASH) diet eating plan, dietary sodium reduction, and moderate alcohol consumption by using booklet and a small group education.

In additional, the participants were trained about healthy diet selection, self-management skills for eating behavior including self-monitoring, self-evaluation, and self-reinforcement by using food model, rice-serving spoon, lunch box, and self-management diary. In this session, the participants were asked to choose food model in each group for breakfast, lunch, and dinner meal. Then, the participants record the proportion of each diet group in self-management diary. Later, the participants engaged in a discussion about their food selection. The main topics of a discussion focused on 1) the appropriate food selection, 2) how to select the healthier foods, and 3) the feasibility of the participants in term of practicing food selection and self-management skills for healthy diet eating behavior at home.



The researcher evaluated the participant's knowledge about healthy eating after providing education and training by using self-management knowledge test to prevent hypertension. The participants had to get a score that passed the criterion (80% of the full score of knowledge test). In the case that they could not meet this criterion, the researcher explained more about the issue that the participant could not answer and led him/her to answer again. Finally, all participants met the criterion of the test.

**Session 4:** Exercise education and training

**Time**: 30 minutes, the first meeting day

**Place:** The meeting room at primary care unit

**Purpose:** 1) To enhance knowledge and skills in exercise; 2) to practice brisk walking, weight lifting, and stretching; and 3) to practice self-management skills for exercise

**Activities:** The participants were assessed their previous knowledge about exercise. The participants received the booklet of exercise, two dumbbells with one kilogram. The researcher provided knowledge about exercise for persons with prehypertension and obesity including principle of exercise (Frequency, intensity, time, and type; FITT), component of exercise, physical fitness, brisk walking, weight lifting, and stretching by using booklet and a small group education.

Moreover, the participants were trained about assessment of exercise intensity (measuring heart rate and talk test), brisk walking, weight lifting, stretching, and self-management skills for exercise including self-monitoring, self-evaluation, and self-reinforcement by using demonstration, return demonstration, and self-management diary. Later, the participants engaged in a discussion about exercise practice. The main topics of a discussion focused on 1) the appropriate exercise, and 2) the feasibility of the participants in term of practicing exercise following the protocol and self-management skills for exercise at home.

The researcher evaluated the participant's knowledge about exercise after providing education and training by using self-management knowledge test to prevent hypertension. The participants had to get a score that passed the criterion (80% of the full score of knowledge test). In the case that they could not meet this criterion, the researcher explained more about the issue that the participant could not answer and led him/her to answer again. Finally, all participants met the criterion of the test.

**Session 5:** Group discussion

**Time:** 60 minutes, the second meeting day (the 1st week)

**Place:** The meeting room at primary care unit

**Purpose:** 1) To explore the participant's perception of strength and barriers to increase healthy diet eating and exercise, 2) to assess participant's practice of healthy diet, exercise, and self-management skills

**Activities:** After participants were provided knowledge, they were asked to perform healthy diet eating and exercise, and to record his/her behaviors in the self-management dairy at home for a week. In this session, the participants were encouraged to share his/her experience regarding their practice, strength, problems, and barriers of performance. The main topic of group discussion focused on 1) strength and barriers of practice, 2) the participant's perception and expectation of their practice, and 3) the feasibility of the participants in term of practicing healthy diet eating, exercise, and self-management skills at home.

The participants completely perform healthy diet eating and exercise for one week. They learned to practice healthy diet selection, brisk walking, weight lifting, stretching, and self-management skills. Each participant shared his or her experience. The other participants in group discussed and encourage his or her to perform and continue his or her healthy eating diet and exercise. On the other, participants in group helped him or her to eliminate barriers. The researcher helped to correct false and unrealistic expectations. All of the participants accepted and expressed their thought with more understanding about their expectations. Researcher asked question to the participants regarding hypertension, healthy diet eating, and exercise. The participants could answer the questions. In the case that the participants could not answer some questions, researcher explained more about the issue that the participants could not answer and ask them to answer again. Finally, all participants could answer the questions.

**Session 6:** Telephone calls

**Time:** 15 -30 minutes at the 2nd, 3rd, 6th, and 10th week

**Place:** The participant's home

**Purpose:** 1) To monitor participant's behaviors, and 2) to encourage participant applying self-management skills to maintain healthy diet eating and exercise

**Activities:** After education session, the participants were asked to engage in healthy diet eating and exercise at home. The participants were also asked to record their healthy diet eating and exercise in self-management diary. Telephone calls were used in this session to monitor the progression of the practices at home by researcher. The telephone calls of the program were focused on: 1) asking the participant to share his/her experiences while at home; 2) discussing the practices that participant actually performed; 3) providing guidance to reduce barriers to the practice; 4) reviewing expected progress based on goal; and 5) encouraging and supporting the participants to perform activities following the protocol.

**Session 7:** Home visit

**Time:** 15-30 minutes at the 4th and 8th week,

**Place:** The participant's home

**Purpose:** 1) To monitor participant's behaviors, and 2) to encourage participant applying self-management to maintain healthy diet and exercise

**Activities:** During the participants practiced and recorded the healthy diet eating and exercise at home by using self-management dairy. Home visits were used to evaluated participant's healthy diet eating and exercise behaviors at the 4th and 8th week by the researcher. Home visit of the program was focused on: 1) asking the participant to share his/her experiences when living at home; 2) assessment regarding his/her practice by using self-management dairy; 3) discussion of the practices that participant actually performed; 4) providing guidance to reduce barriers to the practice; and 5) focusing on their progress and providing verbal support and encouragement.

**3. Evaluation phase:**

The evaluation phase was carried out at the 12th week and aimed to 1) evaluate effects of the SMPP in experimental group; 2) obtain data about blood pressure and body mass index for posttest both experimental and control groups by research assistant.

The participants in the control group visited the PCU for discussion about health and health behaviors. They asked to perform physical fitness test. Their blood pressure and BMI were checked.

For the experimental group, each participant was encouraged to evaluate the achievement of his/her practice goal. The participants were encouraged to share their practice of self-management skills about eating and exercise behaviors. Then, the researcher encouraged them for using self-management skills to manage their behaviors and reduce blood pressure and BMI, and terminate program. The summary of the intervention procedure was described in table 6.

**Table 6** Summary of the intervention procedure

| Session | Nursing activities | Instruments | Method |
|---|---|---|---|
| **The recruitment day** | | | |
| **Session 1:**<br>Problem assessment and motivation<br>Time: 30 minutes<br>Place: PCU | - To make the relationship with participants<br>- To explain about the program and role of researcher and research assistant<br>- To assess health, health behaviors, physical fitness, blood pressure, body weight, height, and BMI. | - Personal information sheet<br>- Automated sphygmoma-nometer<br>- Automatic weight scale<br>- A portable stadiometer | - Group discussion |

**Table 6** Summary of the intervention procedure (Continued)

| Session | Nursing activities | Instruments | Method |
|---|---|---|---|
| | - To encourage the participants to assess their health problem and health behaviors, to express and share about their health behaviors and experience about diet control and exercise<br>- To motivate the participants to change their behavior and help them to set goal of eating behavior and exercise. | | |
| **Session 2:** Hypertension education<br>Time: 30 minutes<br>Place: PCU | - To assess the participant's knowledge about hypertension<br>- To provide the booklet of hypertension<br>- To provide knowledge about hypertension including type, risk factors, sign and symptom, complication, and treatment of hypertension<br>- To ask question and discussion about hypertension.<br>- To evaluate participant's knowledge after providing education<br>- To explained more about the issue that the participant could not answer and ask him/her to answer again | - self-management knowledge test to prevent hypertension<br>- Hypertension booklet | - Group education |

**Table 6** Summary of the intervention procedure (Continued)

| Session | Nursing activities | Instruments | Method |
|---|---|---|---|
| **Session 3**: Healthy diet education and training Time: 30 minutes Place: PCU | - To assess participant's knowledge about healthy eating diet<br>- To provide the booklet of healthy diet, self-management diary, rice-serving spoon, and lunch box<br>- To provide knowledge about healthy diet including weight loss, daily calories needs, the Thai food guide (Nutrition Flag), number of serving in each diet group, Diet Approach to Stop Hypertension (DASH) diet eating plan, dietary sodium reduction, and moderate alcohol consumption<br>- To train the participants about healthy diet selection, self-management skills for eating behavior including self-monitoring, self-evaluation, and self-reinforcement<br>- To ask the participants to choose food model in each group for breakfast, lunch, and dinner meal<br>- To encourage the participants record the proportion of each diet group in self-management diary | - self-management knowledge test to prevent hypertension<br>- Booklet of healthy diet<br>- Self-management diary<br>- Rice-serving spoon<br>- Lunch box<br>- food model | - Group discussion<br>- Demonstration and return demonstration |

**Table 6** Summary of the intervention procedure (Continued)

| Session | Nursing activities | Instruments | Method |
|---|---|---|---|
| | - To promote the participants engage in a discussion about their food<br>- To evaluate the participant's knowledge about healthy eating after providing education and training<br>- To explain more about the issue that the participant could not answer and led him/her to answer again | | |
| **Session 4:**<br>Exercise education and training<br>Time: 30 minutes<br>Place: PCU | - To assess the participant's knowledge about exercise<br>- To provide the exercise booklet and two dumbbells with one kilogram<br>- To provide knowledge about exercise including principle of exercise (Frequency, intensity, time, and type; FITT), component of exercise, physical fitness, brisk walking, weight lifting, and stretching | - self-management knowledge test to prevent hypertension<br>- Exercise booklet<br>- Two dumbbells with one kilogram | - Group discussion<br>- Demonstration and return demonstration |

**Table 6** Summary of the intervention procedure (Continued)

| Session | Nursing activities | Instruments | Method |
|---|---|---|---|
| | - To train the participants about assessment of exercise intensity (measuring heart rate and talk test), brisk walking, weight lifting, stretching, and self-management skills for exercise including self-monitoring, self-evaluation, and self-reinforcement<br>- To encourage the participants engage in a discussion about exercise practice<br>- To evaluate the participant's knowledge about exercise after providing education and training<br>- To explain more about the issue that the participant could not answer and led him/her to answer again | - Self-management diary | |
| **Week 1**<br>**Session 5:**<br>Group discussion<br>Time: 60 minutes<br>Place: PCU | - Asked the participants to perform healthy diet eating and exercise, and to record his/her behaviors in the self-management dairy at home for a week after education session<br>- To encourage the participants to share his/her experience regarding practice, strength, problems, and barriers of performance at home | - Self-management diary | - Group discussion |

**Table 6** Summary of the intervention procedure (Continued)

| Session | Nursing activities | Instruments | Method |
|---|---|---|---|
| | - To encourage the participants in group discuss and encourage his or her friend to perform and continue his or her healthy eating diet and exercise<br>- To encourage the other, participants in group helped him or her friend to eliminate barriers<br>- To help the participants correcting false and unrealistic expectations<br>- To ask question to the participants regarding hypertension, healthy diet eating, and exercise<br>- To explain more about the issue that the participants could not answer and ask them to answer again | | |
| **Session 6:**<br>Telephone call<br>Time: 15-30 minutes<br>at the 2nd, 3th, 6th, and 10th week<br>Place: The participant's home | - To ask the participants engaging in healthy diet eating and exercise at home<br>- To ask the participants recording their healthy diet eating and exercise in self-management diary<br>- To use telephone calls monitoring the progression of the practices at home | - Self-management diary | -Telephone calls |

**Table 6** Summary of the intervention procedure (Continued)

| Session | Nursing activities | Instruments | Method |
|---|---|---|---|
| | - To ask the participant to share his/her experiences while at home<br>- To discuss about the practices that participant actually performed<br>- To provide guidance to reduce barriers to the practice<br>- To review the expected progress based on goal<br>- To encouraging and supporting the participants to perform activities following the protocol | | |
| Session 7<br>Home visit<br>Time: 15-30 minutes at the 4th and 8th week<br>Place: the participant's home | - To visit the participant's home<br>- To evaluate the participant's healthy diet eating and exercise behaviors at the 4th and 8th week<br>- To ask the participant to share his/her experiences when living at home<br>- To assess his/her practice<br>- To discussion about the practices that participant actually performed<br>- To provide guidance to reduce barriers to the practice<br>- To encouraging and supporting the participants to perform activities following the protocol. | - Self-management diary | - Home visit |

**Ethical consideration: protection of the human rights subjects**

This study was proved the ethical and permission for data collection from the Research Ethics Committee of Chulalongkorn University (code: 042/59). After that the permission letter for data collection will be sent to the director of district public health office and the chief of the selected PCU, where the data was collected. Each participant was be informed regarding the objectives of the study, risk and benefit of program, procedure, and right to withdraw from the study by the researcher. Participants could ask the research for other information that made them more understanding. Participants were assured that their willingness or lack of participation in this study had no implications for health care services that we were received. All participants were telling that they were able to withdraw from the study at any time. The decision to discontinue participating in this study did not affect their relationship with health care providers or their access to any services available at the PCU.

**Data collection procedures**

After the study was approved by the Research Ethics Review Committee, the researcher brought the letter from the Faculty of Nursing, Chulalongkorn University to the director of district public health office and the chief of the selected primary care unit (PCU) for reviewing participant's data and data collection. The participants who met inclusion criteria were recruited. They were clearly explained the objectives, procedures, information about protection of the human rights of participants, and details of program about its advantages and disadvantages. After the participant made a decision to participate in the study, they were asked to sign the consent form. The data of each participant was obtained by the research assistant ant on the first day at PCU. The data included the personal data, blood pressure, and BMI following the guideline as baseline. The control group received conventional care while the experimental group received the SMPP. At the $12^{th}$ week, the data included blood pressure and BMI was obtained as posttest at PCU. Finally, the researcher checked the questionnaire and clean data prior to data analysis.

**Data analysis**

The data was analyzed using PASW statistic software, version 18. The statistical significance for analysis was set satisfies significance at the p<.05 as follows:

1. Descriptive statistics were used to describe the demographic characteristics of the participants including frequency, range, mean, standard deviation, and percentage. Blood pressure and BMI were analyzed by mean and standard deviation.

2. Independent t-test was performed to determine the differences in mean SBP, mean DBP, and BMI between control and experimental group at baseline and at the $12^{th}$ week.

3. Paired t-test was performed to compare the differences in mean SBP, mean DBP, and BMI between baseline and the $12^{th}$ week in each group.

**Assumption testing**

The assumptions for the independent t-test and paired t-test were tested before analysis. The following assumptions were examined to ensure the validity of statistical calculations including normality, homogeneity of variance, and independence.

1. Normality distribution of dependent variables was tested. The dependent variables including SBP, DBP, and BMI at baseline and the $12^{th}$ week were accepted as a normal distribution with the test of One-Sample Kolmogorov-Smirnov Test (KS-test). The results illustrated the non-significance ($p$>.05) among all dependent variables which indicated to accept the null hypothesis that enabled the study to detect normal distributions of the result (Appendix N).

2. Homogeneity of variance was required. Levene's test of equality of variance matrices that produced $p$-values of >.05 indicating no significant differences. The results illustrated the non-significance ($p$>.05) among all dependent variables which indicated to accept the null hypothesis that variance were equal.

3. Independence, all assumptions regarding to independence were met since SBP, DBP, and BMI were measured independently by each participant. This study comprised two groups including the control and the experimental groups

# CHAPTER IV
# RESEARCH RESULTS

The study aims to examine effects of self-management promotion program (SMPP) on blood pressure and body mass index in persons with prehypertension and obesity. This chapter presents the analysis of the data. The research findings are divided into four parts including 1) characteristics of the participants, 2) results of hypothesis testing, 3) a description of additional findings in this study, and 4) effect size of the study

## 1. Characteristics of the participants

This part presents the characteristics of the participants including personal characteristics and physiological characteristics as follows:

### 1.1 Personal characteristics of the participants

The mean age of the participants in the control group was 53.00 (SD = 5.55), while 56.25% was in the age group of 55-59 years. About two third of the participants (68.75%) were female. The majority of the participants lived with spouse (75.00%), completed primary school education (68.75%), and was agriculturist (50.00%). Almost half of the participants had family history of hypertension (46.88%), while 81.25% of the participants had no comorbidity. The most of all participants were not exercise (75.76%), non-smoking (96.97%), and not drinking (90.91%).

Regarding the characteristic of the participants in the experimental group, the mean age of the participants was 51.55 (SD = 4.67) and was in the age group of 50-54 years. The most of the participants was female (75.76%) and living with spouse (84.85%). About 75.76% were primary education level and were agriculturist (60.61%). A half of the participants (57.58%) had family history of hypertension and two third of the participants (69.70%) had no comorbidity.

However, the chi-square test was used to test the difference of demographic characteristics at pretest. The results revealed that the characteristics between the experimental and control groups were not significantly different. Personal characteristics of the participants were shown in table 7

**Table 7** Personal characteristics of the participants at baseline

| Characteristics | Control (n = 32) | Experimental (n = 33) | $\chi^2$ | *p*-Value |
|---|---|---|---|---|
| | n (%) | n (%) | | |
| **Age** (year) | | | 7.25 | .06 |
| 40-44 | 6 (18.75) | 4 (12.12) | | |
| 45-49 | 2 (6.25) | 6 (18.18) | | |
| 50-54 | 6 (18.75) | 13 (39.40) | | |
| 55-59 | 18 (56.25) | 10 (30.30) | | |
| Average age (year) | M =53.00 | M = 51.55 | | |
| | SD = 5.55 | SD = 4.67 | | |
| Range of age | 42-59 | 42-58 | | |
| **Gender** | | | | |
| Male | 10 (31.25) | 8 (24.24) | .81 | .37 |
| Female | 22 (68.75) | 25 (75.76) | | |
| **Marital status** | | | | |
| Without spouse | 8 (25.00) | 5 (15.15) | .99 | .32 |
| With Spouse | 24 (75.00) | 28 (84.85) | | |
| **Education level** | | | | |
| Primary | 22 (68.75) | 25 (75.76) | .40 | .59 |
| Secondary and higher | 10 (31.25) | 8 (24.24) | | |
| **Occupation** | | | .90 | .62 |
| Agriculturist | 16 (50.00) | 20 (60.61) | | |
| Laborer | 11 (34.38) | 8 (24.24) | | |
| Others | 5 (15.62) | 5 (15.15) | | |
| **Family history of hypertension** | | | .75 | .39 |
| No | 17 (53.12) | 14 (42.42) | | |
| Yes | 15 (46.88) | 19 (57.58) | | |
| **Comorbidity** | | | 1.17 | .28 |
| No | 26 (81.25) | 23 (69.70) | | |
| Yes | 6 (18.75) | 10 (30.30) | | |

**Table 7** Personal characteristics of the participants at baseline (Continued)

| Characteristics | Control (n = 32) n (%) | Experimental (n = 33) n (%) | $\chi^2$ | *p*-value |
|---|---|---|---|---|
| **Exercise behavior** | | | 1.99 | .19 |
| Yes | 13 (40.62) | 8 (24.24) | | |
| No | 19 (59.38) | 25 (75.76) | | |
| **Smoking behavior** | | | | 1.00 |
| Yes | 1 (3.12) | 1 (3.03) | | |
| No | 31 (96.80) | 32 (96.97) | | |
| **Alcohol drinking behavior** | | | | .48 |
| Yes | 5 (12.50) | 3 (9.09) | | |
| No | 27 (87.50) | 30 (90.91) | | |

**1.2 Physiological characteristics of the participants**

This part presented the characteristics of the participants including systolic blood pressure (SBP), diastolic blood pressure (DBP), and body mass index (BMI). At baseline, the means of SBP and DBP of the participants in the control group were 129.41 (SD = 5.30) mmHg and 82.06 (SD = 5.00) mmHg, respectively while the mean of BMI was 28.31 kg/m2 (SD = 2.31). In the experimental group, the means of SBP and DBP of the participants in the experimental group were 131.21 (SD = 5.65) mmHg and 82.39 (SD = 5.77) mmHg, respectively while the mean of BMI was 28.26 (SD = 2.96). Independent t-test was used to test the difference of SBP, DBP, and BMI between the experimental and the control group at baseline. The results revealed that SBP, DBP, and BMI between groups were not significantly different ($p>.05$) as shown in table 8.

**Table 8** Comparisons of mean for SBP, DBP, and BMI between the experimental and control group at baseline

| Physiological characteristics | Control (n=32) | | Experimental (n=33) | | *t* | *p*-value |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | | |
| SBP | 129.41 | 5.30 | 131.21 | 5.65 | 1.33 | .19 |
| DBP | 82.06 | 5.00 | 82.39 | 5.77 | .25 | .81 |
| BMI | 28.31 | 2.31 | 28.26 | 2.96 | -.066 | .94 |

**2. The results of hypothesis testing**

**Hypothesis 1:** The participants in the experimental group had significant lower SBP, DBP, and BMI than those in the control group after completion of the program.

To answer the hypothesis, the independent t-test statistics was performed to test the difference of SBP, DBP, and BMI between the control and the experimental groups. The independent t-test results revealed that SBP and DBP were significantly lower in the experimental group than the control group ($t = -4.46$, $p<.05$; $t = -3.03$, $P<.05$) whereas BMI was not significantly different between two groups ($t = -1.87$, $p>05$). That meant the participants in the experimental group had better SBP and DBP than those in the control group ($p<.05$) as shown in the table 9.

**Table 9** The comparisons of mean of SBP, DBP, and BMI between the experimental and control groups at the $12^{th}$ week

| Dependent Variables | Control group (n=32) | | Experimental group (n=33) | | t | *p*-value |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | | |
| SBP | 131.06 | 8.15 | 122.45 | 7.40 | -4.46 | <.001 |
| DBP | 82.69 | 5.98 | 78.21 | 5.93 | -3.03 | <.001 |
| BMI | 28.46 | 2.35 | 27.24 | 2.89 | -1.87 | .066 |

**Hypothesis 2**: After participating in the self-management promotion program, the participants in the experimental group had lower SBP, DBP, and BMI than before participating in the program.

To answer the hypothesis, the paired t-test was performed to test the difference of the mean of SBP, DBP, and BMI between baseline and the 12th week in each group. The results of the paired t-test revealed that the mean of SBP, DBP, and BMI of the participants at the 12th week in the control group were not different from baseline while the paired t-test revealed that the participants in the experimental group after participating in the SMPP were lower SBP, DBP, and BMI than before participating in the program ($p<.05$) as shown in table 10.

**Table 10** Comparisons of mean of SBP, DBP, and BMI between baseline and the 12th week in the control and the experimental groups

| Dependent variables | Control (n = 32) | | | | t | *p* | Experimental (n = 33) | | | | t | *p* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline | | 12th week | | | | Baseline | | 12th week | | | |
| | Mean | SD | Mean | SD | | | Mean | SD | Mean | SD | | |
| SBP | 129.41 | 5.30 | 131.06 | 8.15 | -1.19 | .24 | 131.21 | 5.65 | 122.45 | 7.40 | 8.06 | <.01 |
| DBP | 82.06 | 5.00 | 82.69 | 5.98 | -.56 | .58 | 82.39 | 5.77 | 78.21 | 5.93 | 5.23 | <.01 |
| BMI | 28.31 | 2.31 | 28.46 | 2.35 | -1.74 | .09 | 28.26 | 2.96 | 27.24 | 2.89 | 11.02 | <.01 |



### 3. A description of additional findings in this study

This part presented the additional information that was recorded during the SMPP. The participants in the experimental group addressed about their experience of the program involving usefulness and suggestions. A summary of these findings were provided as follows:

#### 3.1. Usefulness of the self-management promotion program

All persons with prehypertension and obesity felt that the program was very useful to help them change their behaviors and improve their health outcomes including SBP, DBP, and BMI. Majority of the participants stated that they would use the knowledge and self-management skills to manage their behaviors in future. The

examples of the program usefulness were provided by participants in the experimental group as follows.

“I gained more knowledge about hypertension, healthy diet, and brisk walking. I applied it to my daily living. It was not difficult to practice; for example, proportion of each diet groups provided in rice-serving spoon, and brisk walking was low cost and easy to do it.”

“I enjoyed the time that I exercised with my husband or my friend. I was listening to music during exercise. It made me relaxed. My friend performed exercise and diet control following me because I lost weight and was in good shape that made me feel good and proud to do it”

“I learned to take responsibility for management of my behaviors through goal setting, record of eating and exercise, and encouragement. If I would like to be healthy, I needed to do it by myself.”

“I had confidence to practice in healthy diet selection and brisk walking. The program provided knowledge and training. These practice made me to ensure that I could do it.”

“I felt good when nurse called me and visited me at home. She paid attention to me. Telephone calls and home visits from nurse motivated and reminded me to continue and change behaviors following goal. I could consult her for my problem and practice.”

“On second meeting time, we had group discussion. I thought I had friends who had the same conditions and problems as me. We could share problems and the way to solve it to each other. I used her tips to reduce fat in soup for her sharing.”

“This program was useful program which was possible, safety, and low cost for practice.”

**3.2. Suggestions about the self-management promotion program**

Suggestions of the participants were focused on providing reinforcement by health care provider such as sticker for persons who reached the goal in each week or certificate for persons who achieved the goal. Moreover, the participants focused on monitoring through telephones calls and home visits. It would be very useful and they also preferred it.

**4. Effect size of the study**

The researcher calculated the standardized difference between means (Cohen's d) to determine the effect size, or the magnitude of the treatment effect. The effect size presents the ability to detect an association between a predictor and an outcome variable (Browner, Newman and Cummings, 1998). The effect size is calculated by the following formula:

$$\text{Effect Size} = \frac{\text{Experimental group mean} - \text{Control group mean}}{\text{Control group standard deviation}}$$

Cohen has suggested that *d*'s of 0.20, 0.50, and 0.80 represent small, medium, and large effect sizes, respectively (Cohen 1992). At the 12$^{th}$ week, the effect size on SBP were large (8.61/8.15 = 1.06), whereas the effect size were medium for both DBP (4.48/5.98 = 0.75) and BMI (1.22/2.35 = 0.52), respectively.



**Summary**

In this study, hypotheses testing were done using independent t-test and paired t-test for SBP, DBP, and BMI. All of dependent variables met the assumptions underlying the statistical testing. The characteristics of the samples in the control and experimental groups were not significantly different. SBP and DBP variables were significantly different between two groups at the 12$^{th}$ week supporting the hypotheses while BMI were not significantly different between two groups over the same period.

# CHAPTER V
# DISSCUSSION, IMPLICATION, AND RECOMMENDATION

This chapter presents summary of the study and a discussion of the research findings, implications for nursing, and recommendations for future research are also described.

## Summary of the Study

A quasi-experimental study, pretest and posttest design aimed to examine effects of the self-management promotion program (SMPP) on blood pressure and body mass index (BMI) in persons with prehypertension and obesity. Sixty-six participants who received health care service from the Mahasawat or Khlongyong 1 primary care units (PCU), Nakhonpathom province, Thailand were recruited. The participants were allocated to either the experimental or the control groups by drawing lots. Thirty-three participants were selected in each group. During follow-up, one participant in the control group could not continue the program; therefore, only 32 participants were in the control group.

The participants in the experimental group received the conventional care and the SMPP. Conventional care was the routine nursing care given by community health nurse for persons with prehypertension and obesity through providing individual or group health education about hypertension and lifestyle modification. The SMPP was a nursing intervention designed to reduce blood pressure and BMI in persons with prehypertension and obesity for performing appropriate behaviors at home. The participants were encouraged to change their behaviors through three self-management skills including self-monitoring, self-evaluation, and self-reinforcement, and were supported by nurse. The SMPP consisted of three phases: 1) problem assessment and motivation, 2) self-management skill training, and 3) self-management practice and monitoring phase. The SMPP covered seven sessions; three sessions at PCU, telephone call session, and home visit session during 12 weeks. The participants in the control group received the conventional care and a booklet which was focused on lifestyle modification. The contents of the booklet

include knowledge about HT, risk factor of HT, healthy eating, brisk walking, weight lifting, and stretching exercise.

The results of this study showed significant improvements in systolic blood pressure (SBP) and diastolic blood pressure (DBP) in the experimental group. The mean of SBP and DBP in the experimental group were lower than in the control group at the 12$^{th}$ week. The mean of SBP and DBP in the experimental group were 122.45 (SD = 7.40) and 78.21 (SD = 5.93) mmHg, whereas the mean of SBP and DBP were 131.06 (SD = 8.15) and 82.69 (SD = 5.98) mmHg, respectively. In addition, SBP and DBP in the experimental group after participation in the SMPP significantly lower than before participation ($p$<.05).

Regarding body mass index (BMI), the results showed significant improvement in BMI in the experimental group. The participants in the experimental group after participating in the SMPP had lower mean of BMI than before participating in the program ($P$<.05). The mean of BMI in the experimental group were 28.26 kg/m$^2$ (SD = 2.96) at baseline and 27.24 kg/m$^2$ (SD = 2.89) at the 12$^{th}$ week. In addition, the mean of BMI in the experimental group were lower than in the control group at the 12$^{th}$ week. Although BMI in the experimental group was lower than another group, no statistical difference between the two groups was found.



**Discussion**

**Hypothesis 1:** The participants in the experimental group had significant lower SBP, DBP, and BMI than participants in control group after completion of the program.

**Hypothesis 2:** After participating in the self-management promotion program, the participants in the experimental group had lower SBP, DBP, and BMI than before participating in the program.

The results of the study supported hypothesis in that participants in the experimental group had significant lower SBP and DBP in the control group after completed program. However BMI between the two groups were not difference. Moreover, the results of the study also supported hypothesis in that after

participating in the SMPP, the participants in the experimental group had lower SBP, DBP, and BMI than before participating in the program.

The results could be explained the SMPP could benefit persons with prehypertension and obesity by lowering blood pressure both SBP and DBP. This program could also reduce BMI, but not significant difference between groups. These results could be explained by the following reasons.

In this study, the SMPP was developed based on self-management method proposed by Kanfer and Goelick-Buy (1991). Self-management was a method that the participants used to maintain and improve their behaviors and it could help them to change their behaviors to the expected behaviors. This is their responsibility leading to reduce blood pressure and BMI.

Based on the self-management method, self-management was a dynamic process in which persons actively manage their behaviors which related to decrease in SBP and DBP. Firstly, the participant's behaviors are observed through self-monitoring, which involves deliberately attending to their own behaviors (Kanfer & Gaelick-Buys, 1991). The obtained data of observation is used to provide estimates of behavior or to monitor relative change in behavior over time. Self-monitoring is an effective tool for behavior change. Its purposes are to increase awareness and monitoring progress (American College of Sports Medicine, 2013). Self-monitoring can effect on behavioral change by reducing undesirable behaviors and increasing target behaviors. On the basis of past experience, participants have built up expectations about acceptable behavior as goal. Self-monitoring was the process that involved observation and record. Participants observed their own behavior and the related factors at least once daily. Their eating and exercise behaviors were recorded. In this way, the participants would pay closer attention to their situation. As a result, it could lead to enhance awareness regarding behavior and motivate them to change their behaviors. The participants in the experimental group were provided with essential information about HT, healthy diet, and exercise for persons with prehypertension and obesity, and encourage setting their goal.

Secondly, self-evaluation was a comparison process. The participants compared the knowledge about healthy diet eating and exercise obtained from their monitoring and the target goal. The results of comparison made the participant had a better understanding about their behaviors and made decision to perform the appropriate behaviors.

Self-reinforcement was participants react cognitively and emotionally to the results of the self-evaluation. The reactions have feedback effects influencing the strength of the preceding behavior, and they have effects influencing the participant's expectation and behavior on future occasions. Self-reinforcement was a process that participants control their own behaviors by reward or punishment. It had relationship between response and outcomes. Self-reinforcement was used to increase the probability that the desired behaviors in the SMPP would be continued in the future. In this case, the results of the study could be ensured the effectiveness of the SMPP in lowering SBP, DBP, and BMI throughout twelve weeks for the participants in the experimental group.

This program applied various strategies to encourage the participants to perform and continue their behavior according to the SMPP. Goal setting could be useful for health behavior change. The participants were trained to set individual goal. It was similar to the previous study using goal setting as strategy in the program for behavioral change in obesity (Ries et al., 2013). The results showed that participants in the experimental group had improve diet and increase physical activity. Consistently, the findings of systematic review focused on use of goal setting as behavioral change in overweight and obesity (Pearson, 2012). The results showed that goal setting could be benefit for changing behaviors, and the participants in the proximal goal setting group had attrition rates less than those in the distal goal setting group. It supported that goal setting was an influence strategy to promote the participants to engage and adhere to the program.

In addition, exercise session was integrated in the SMPP. The American Colleague of Sport Medicine (ACSM) recommended aerobic, resistance and flexibility exercise in people who had high blood pressure and obese. In the SMPP, all

participants in the experimental group were trained and practiced skills including brisk walking (aerobic), weight lifting (resistance), and stretching exercise (Flexibility). Brisk walking had effectively improved cardiorespiratory fitness leading to reduce blood pressure and increased the energy expenditure leading to reduce body weight and BMI. The previous study revealed that brisk walking during 12 weeks was beneficial for lowering both blood pressure and BMI in obese (Azeem, 2011). It was consistency with Melam and colleagues's findings (Melam et al., 2016) that supported lowering BMI by brisk walking during 10 weeks in women with overweight.

Group discussion was conducted after the participant performed and recorded his or her healthy eating and exercise behaviors for one weeks. It also include in the group education sessions in the first four sessions of the program. Group discussion could be an excellent strategy for enhancing the participant's motivation and critical thinking. This strategy was a platform where the participant was provided a chance to express his or her views. It could be the way that made the researcher more understanding the participants; and it also helped the researcher evaluate perception, knowledge, and behavior of them. Group discussion could be also a great way to develop better social and emotional. Correspondingly, Merakou et al. (2015) found that group discussion was more effective strategy compared with individual education in the improvement of clinical outcomes such as BMI in patients with diabetes mellitus.

For telephone call follow up, the participants in the experiment group was provided four telephone call follow up with 15-30 minutes to encourage participants continuing their behaviors related their goals at $2^{nd}$, $3^{rd}$, $6^{th}$, and $10^{th}$ week. It was necessary strategy to enhance awareness, motivation, and reinforcement for behavioral change to maintain self-management (Song & Nam, 2015). Moreover, behavioral change could lead to improve SBP, DBP, and BMI for participants. Similarly, the study of Leemrijse et al. (2012) found that a lifestyle intervention by telephone might be help to reduce blood pressure and BMI.

In the SMPP, home visit were provide two times at the $4^{th}$ and $8^{th}$ week by researcher to monitor participant's behaviors, and to encourage them applying self-

management to maintain healthy diet and exercise. This session was focused on share his/her experiences when living at home, assessment of their practice, discussion of their the practices, and providing guidance to reduce barriers of practice. Home visit was recognized as tool for observation and assessment of the participant's condition by nurse profession. This session was a reasonable potential for change the participant's behavior. It could help nurse identified and evaluated the participant's need for behavior change.

The SMPP was developed based on self-management method (Kanfer & Goelick-Buy, 1991), clinical practice guidelines, and existing knowledge. The program was provided the knowledge and practice skills to manage the health behaviors. It composed of three phases that covered the seven sessions of implementation within 12 weeks. The strategies, which were included in the program, were group discussion, telephone call, and home visit. These strategies were essential tool for motivation and improvement of knowledge and skills in the participants to change their behaviors leading to reduce blood pressure and BMI. The SMPP appeared to be and effective nursing intervention to reduce blood pressure and body mass index in persons with prehypertension and obesity.

Although the results of the study showed that the participants in the experimental group had reduced BMI than before participating in the program, BMI between the two groups were not statistically difference ($p>.05$). The results could be explained that the control group received the conventional care by community health nurse at the first meeting, and also were given booklets similar to the participants in the experimental group. The content of the booklet were covered hypertension, healthy diet, and exercise. The participants in the control group who performed following this guideline could be reduce BMI as the same with the experimental group. It could be explained by the duration of the program. Although BMI between two groups were not difference, BMI in the experimental group was lower than the control group. The duration were extended might be make a different result of the program. Consistently, Lee et al. (2011) conduct a quasi-experimental of self-management program for obesity control among middle-aged women in Korea.

The findings showed that there were significant changes in the health behavior, amount of body fat, and blood pressure of the participants in the experimental group, but there was no significant difference between group in their BMI, blood profile, or blood pressure. The period of the study was also during 12 weeks. It was consistency with the study of Pamungkas et al. (2015). They studied the effect of dietary and exercise self-management support program on dietary behavior exercise behavior and clinical outcomes within 8 weeks.

On the other hands, Pakdevong and Pongprapa (2012) found that the program of self-management program could reduce BMI of the participants in the experimental group within one year. Correspondingly, Pettman et al. (2008) revealed that the lifestyle program including behavioral self-management tools could reduce BMI of the participants within 16 weeks. The results there were significantly differences in their behavior and some outcomes between the experimental and control groups, but the BMI were no significant differences. Thus, providing more knowledge by booklets in the control group after completion of the program and extension of the program period might give significant difference between the experimental and control group.

**Implications and recommendation**

The findings of this study had implications for nursing practice, nursing education, and national health policy. In addition, recommendations for future research were presented.

**Implications for nursing practice**

As the results showed that the SBP, DBP, and BMI of persons with prehypertension and obesity decrease substantially in the 12$^{th}$ weeks after finished the SMPP. Therefore, community health nurse should utilize the components of this program in routine daily practice at primary care unit to prevent blood pressure progression to hypertension, maintain blood pressure achievement goal, and reduce BMI in persons with prehypertension and obesity.

**Implications for nursing education**

Based on the results of this study, curriculum of hypertensive prevention for person with prehypertension and obesity should be developed for training advanced nurse practitioners working at primary care units. The curriculum should encompass: the SMPP to activate self-management and lifestyle modification to enhance nursing knowledge about management of hypertensive prevention following HT, healthy diet, and exercise activities; self-management skills and non-pharmacological therapy to lower SBP, DBP, and BMI, i.e. checking the serving of each day, diet selection, brisk walking, weight lifting, stretching exercise. Finally, providing support for participants including group discussion, telephone call and home visit is essential to maintain their self-management skills as needed.

**Recommendations for future research**

1. The duration of the SMPP was 12 weeks and assessment of blood pressure and BMI was done at one time point ($12^{th}$ week). Thus, further research should observe long term change in blood pressure and BMI at several time points to indicate the long term effect of the program.

This study focused on reducing blood pressure and BMI in persons with prehypertension and obesity who lived only in rural area. According to the difference of context in rural and urban area may result in health behaviors such as eating and exercise behaviors. Thus, future research should study the effect of the SMPP on blood pressure and BMI in persons with prehypertension and obesity in urban areas

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# APPENDICES

# APPENDIX A

## Approval of dissertation proposal

ประกาศ
คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
เรื่อง การอนุมัติหัวข้อดุษฎีนิพนธ์นิพนธ์ ครั้งที่ 3/2556 ประจำปีการศึกษา 2556

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**นิสิตผู้ทำวิจัยและอาจารย์ที่ปรึกษาดุษฎีนิพนธ์**

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|---|---|
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| อาจารย์ที่ปรึกษาหลัก | รองศาสตราจารย์ ร.ต.อ.หญิง ดร. ยุพิน อังสุโรจน์ |
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| กรรมการภายนอก | นายแพทย์ บัณฑิต ศรไพศาล |
| ชื่อหัวข้อดุษฎีนิพนธ์ | ผลของโปรแกรมการจัดการตนเองต่อระดับความดันโลหิตและดัชนีมวลกายของผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน<br>EFFECTS OF SELF-MANAGEMENT PROGRAM ON BLOOD PRESSURE AND BODY MASS INDEX IN PERSONS WITH PREHYPERTENSION AND OBESITY |
| ครั้งที่อนุมัติ | 3/2556 |
| ระดับ | ปริญญาเอก |

**นิสิตผู้ทำวิจัยและอาจารย์ที่ปรึกษาดุษฎีนิพนธ์**

| | |
|---|---|
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| ชื่อหัวข้อดุษฎีนิพนธ์ | ผลของโปรแกรมการจัดการความเจ็บปวดร่วมกับการดูแลแบบผสมผสานต่อความปวดแบบเฉียบพลันและการตอบสนองทางสรีรวิทยาในผู้ป่วยผ่าตัดหัวใจ<br>EFFECTS OF PAIN MANAGEMENT COMBINED WITH COMPLEMENTARY CARE PROGRAM ON ACUTE PAIN AND PHYSIOLOGICAL RESPONSES IN PATIENTS WITH CARDIAC SURGERY |
| ครั้งที่อนุมัติ | 3/2556 |
| ระดับ | ปริญญาเอก |

วรัพ อนุมัติ
16 พค. 2557

# APPENDIX B

## Documentary proof of ethical clearance

AF 01-12

คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย
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**COA No.** 042/2559

## ใบรับรองโครงการวิจัย

**โครงการวิจัยที่ 005.1/59** : ผลของโปรแกรมการจัดการตนเองต่อระดับความดันโลหิตและดัชนีมวลกายของผู้ที่มีภาวะก่อนความดันโลหิตสูงและความดันโลหิตสูง

**ผู้วิจัยหลัก** : นางสาวนิตา นครวิเชียร

**หน่วยงาน** : คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย ได้พิจารณา โดยใช้หลักของ The International Conference on Harmonization – Good Clinical Practice (ICH-GCP) อนุมัติให้ดำเนินการศึกษาวิจัยเรื่องดังกล่าวได้

ลงนาม.....
(รองศาสตราจารย์ นายแพทย์ปรีดา ทิพยประดิษฐ)
ประธาน

ลงนาม.....
(ผู้ช่วยศาสตราจารย์ดร.ปัทมาวรี พัชรชนะ ณ อยุธยา)
กรรมการและเลขานุการ

**วันที่รับรอง** : 11 มีนาคม 2559 **วันหมดอายุ** : 10 มีนาคม 2560

**เอกสารที่คณะกรรมการรับรอง**

1) โครงการวิจัย
2) ข้อมูลสำหรับกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัยและใบยินยอมของกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย
3) ผู้วิจัย
4) แบบสอบถาม

**เลขที่โครงการวิจัย** 005.1/59
**วันที่รับรอง** 11 มี.ค. 2559
**วันหมดอายุ** 10 มี.ค. 2560

**เงื่อนไข**

1. ข้าพเจ้ายินยอมที่เป็นการยึดหลักจริยธรรม ตามที่ระบุในข้อมูลการวิจัยก่อนได้รับการอนุมัติจากคณะกรรมการพิจารณาจริยธรรมการวิจัยฯ
2. หนังสือรับรองโครงการวิจัยนี้มีอายุ การดำเนินการวิจัยต้องยุติเมื่อหนังสือรับรองหมดอายุ ต้องขออนุมัติใหม่ล่วงหน้าไม่น้อยกว่า 1 เดือน พร้อมส่งรายงานความก้าวหน้าการวิจัย
3. ต้องดำเนินการวิจัยตามที่ระบุไว้ในโครงการวิจัยอย่างเคร่งครัด
4. ใช้เอกสารข้อมูลสำหรับกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย ใบยินยอมของกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย และเอกสารอื่นๆ ในการวิจัย (ถ้ามี) **เฉพาะที่ประทับตราคณะกรรมการเท่านั้น**
5. หากมีเหตุการณ์ไม่พึงประสงค์ร้ายแรงในสถานที่เก็บข้อมูลที่ขออนุมัติจากคณะกรรมการ ต้องรายงานคณะกรรมการภายใน 5 วันทำการ
6. หากมีการเปลี่ยนแปลงการดำเนินการวิจัย ให้ส่งคณะกรรมการพิจารณาปรับรองก่อนดำเนินการ
7. โครงการวิจัยไม่เกิน 1 ปี ส่งแบบรายงานสิ้นสุดโครงการวิจัย (AF 03-12) และแบบตัดต่อผลการวิจัย ภายใน 30 วัน เมื่อโครงการวิจัยเสร็จสิ้น สำหรับโครงการวิจัยที่เป็นวิทยานิพนธ์ให้ส่งแบบตัดต่อผลการวิจัย ภายใน 30 วัน เมื่อโครงการวิจัยแล้วเสร็จ

# APPENDIX C

## Participant information sheet and informed consent form

**ข้อมูลสำหรับกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย**
**(กลุ่มที่1 คือ กลุ่มที่ได้รับการพยาบาลตามปรกติ)**
**(Participant information sheet)**


**ชื่อโครงการวิจัย** "ผลของโปรแกรมส่งเสริมการจัดการตนเองต่อระดับความดันโลหิตและดัชนีมวลกายของ ผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน"

**ชื่อผู้วิจัย** นางสาวธิดา ทองวิเชียร

**ตำแหน่ง** นิสิตคณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

**สถานที่ติดต่อผู้วิจัย** คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย อาคารบรมราชชนนีศรีศตพรรษ ชั้น 11 ถนนพระราม1 ปทุมวัน กทม. 10330 หรือ 7/297 ถนนเลียบคลองทวีวัฒนา แขวงศาลาธรรมสพน์ เขตทวีวัฒนา กทม. 10170

**โทรศัพท์** โทรศัพท์มือถือ 082 335 8676

**E-mail** ta_thida@hotmail.com


ข้อมูลที่เกี่ยวข้องกับการให้ความยินยอมในการวิจัยประกอบด้วยคำอธิบาย ดังต่อไปนี้

1. ขอเรียนเชิญท่านเข้าร่วมในการวิจัยก่อนที่ท่านจะตัดสินใจเข้าร่วมในการวิจัย มีความจำเป็นที่ท่านควรทำความเข้าใจว่างานวิจัยนี้ทำเพราะเหตุใด และเกี่ยวข้องกับอะไร กรุณาใช้เวลาในการอ่านข้อมูลต่อไปนี้อย่างละเอียดรอบคอบ และสอบถามข้อมูลเพิ่มเติมหรือข้อมูลที่ไม่ชัดเจนได้ตลอดเวลา

2. โครงการวิจัยนี้เป็นการวิจัยเชิงทดลองเพื่อศึกษาเกี่ยวกับผลของโปรแกรมส่งเสริมการจัดการตนเองต่อระดับความดันโลหิตและดัชนีมวลกายของผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน

3. วัตถุประสงค์ของการวิจัย

3.1 เพื่อเปรียบเทียบความดันโลหิตและดัชนีมวลกายของผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วนก่อนและหลังเข้าร่วมโปรแกรมการจัดการตนเอง

3.2 เปรียบเทียบความดันโลหิตและดัชนีมวลกายของผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วนระหว่างกลุ่มที่ได้รับโปรแกรมการจัดการตนเองและกลุ่มที่ได้รับการพยาบาลตามปรกติ

4. ประชากรและกลุ่มตัวอย่างในงานวิจัย คือ ผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน ท่านได้รับการคัดเลือกเป็นกลุ่มตัวอย่าง โดยการสุ่มอย่างง่าย (simple random) ซึ่งงานวิจัยนี้ใช้กลุ่มตัวอย่างจำนวน 66 คน แบ่งเป็น 2 กลุ่ม (กลุ่มที่ได้รับการพยาบาลตามปรกติ-กลุ่มที่1 และกลุ่มที่ได้รับโปรแกรมการจัดการตนเอง-กลุ่มที่ 2) กลุ่มละ 33 คน โดยมีเกณฑ์การคัดเลือกเข้าเป็นกลุ่มตัวอย่างและเกณฑ์การคัดออกจากการเป็นกลุ่มตัวอย่าง ดังนี้

4.1 เกณฑ์การคัดเข้าเป็นกลุ่มตัวอย่าง

1) อายุ 35-59 ปี ทั้งเพศชายและหญิง

2) ความดันโลหิต 120-139/80-89 มม.ปรอท

3) ดัชนีมวลกายตั้งแต่ 25 กก./เมตร$^2$

4) ไม่เคยได้รับยารักษาโรคความดันโลหิตสูง

5) สามารถติดต่อสื่อสาร อ่าน และเขียนภาษาไทยได้

6) ยินดีเข้าร่วมการวิจัย

4.2 เกณฑ์การคัดออกจากการเป็นกลุ่มตัวอย่าง

1) เข้าร่วมกิจกรรมไม่ครบตามที่กำหนดไว้ คือ ครั้งที่ 1 และครั้งที่ 2

5. ขั้นตอนการดำเนินงานวิจัย

5.1 ท่านจะได้รับแบบสอบถามจำนวน 1 ชุด ได้แก่ แบบสอบถามข้อมูลส่วนบุคคล ข้อมูลภาวะสุขภาพ และพฤติกรรมเสี่ยงต่อการเกิดโรคความดันโลหิตสูง จำนวนทั้งหมด 14 ข้อ ซึ่งเป็นการตอบแบบสอบถามด้วยตนเอง ใช้เวลาประมาณ 15 นาที ณ โรงพยาบาลส่งเสริมสุขภาพ

5.2 หลังตอบแบบสอบถาม ท่านจะได้รับการประเมินสมรรถภาพทางกายจากผู้วิจัย ได้แก่ ความดันโลหิต ชีพจร น้ำหนัก ส่วนสูง ดัชนีมวลกาย การทดสอบก้าวขึ้นลงเป็นจังหวะ 3 นาที การทดสอบยืนและนั่งบนเก้าอี้ และการทดสอบนั่งงอตัว ใช้เวลาประมาณ 15 นาที ณ โรงพยาบาลส่งเสริมสุขภาพ

5.3 หลังจากท่านได้รับการประเมินสมรรถภาพทางกาย ท่านจะได้รับความรู้เพื่อป้องกันโรคความดันโลหิตสูง ณ โรงพยาบาลส่งเสริมสุขภาพ ดังนี้

5.3.1 ความรู้เกี่ยวกับภาวะก่อนความดันโลหิตสูงและโรคความดันโลหิตสูง ได้แก่ ชนิด ปัจจัยเสี่ยง อาการ ภาวะแทรกซ้อน และการรักษาโรคความดันโลหิตสูง เป็นระยะเวลา 30 นาที

5.3.2 หลังจากนั้นท่านจะได้รับความรู้เกี่ยวกับการเลือกรับประทานอาหาร (30 นาที) และการออกกำลังกาย (30 นาที)

5.4 ในสัปดาห์ที่ 12 หลังจากสิ้นสุดโปรแกรมในข้อ 5.3 ผู้วิจัยขอเชิญท่านเข้าร่วมกิจกรรมแลกเปลี่ยนประสบการณ์เพื่อประเมินผลการเข้าร่วมโครงการและประเมินภาวะสุขภาพอีกครั้ง ใช้เวลาประมาณ 60 นาที ณ โรงพยาบาลส่งเสริมสุขภาพ

5.4.1 ท่านจะได้รับการประเมินสมรรถภาพทางกาย ได้แก่ ความดันโลหิต ชีพจร น้ำหนัก ส่วนสูง ดัชนีมวลกาย การทดสอบก้าวขึ้นลงเป็นจังหวะ 3 นาที การทดสอบยืนและนั่งบนเก้าอี้ และการทดสอบนั่งงอตัว (15 นาที)

5.4.2 พูดคุยแลกเปลี่ยนประสบการณ์การปฏิบัติตัวเพื่อป้องกันโรคความดันโลหิตสูง รวมถึงปัญหาและอุปสรรคหลังจากที่ได้รับความรู้เพื่อป้องกันโรคความดันโลหิตสูง (20 นาที)

5.4.3 ผู้วิจัยทบทวนเรื่องพฤติกรรมการป้องกันโรคความดันโลหิตสูง และสรุปปิดโครงการ (10 นาที)

6. ในการวิจัยครั้งนี้ใช้ข้อมูลการคัดกรองกลุ่มเสี่ยงโรคความดันโลหิตสูงโดยได้รับการอนุมัติจากผู้อำนวยการโรงพยาบาลส่งเสริมสุขภาพตำบล

7. การเข้าร่วมการวิจัยในครั้งนี้มีประโยชน์ต่อผู้เข้าร่วมโครงการ คือผู้เข้าร่วมโครงการได้รับความรู้เกี่ยวกับโรคความดันโลหิตสูง สาเหตุ ปัจจัยเสี่ยง อาการ และพฤติกรรมการรับประทานอาหารและการออกกำลังกายจากผู้วิจัย

8. การเข้าร่วมในการวิจัยของท่านเป็นโดย**สมัครใจ** และสามารถ**ปฏิเสธ**ที่จะเข้าร่วมหรือ**ถอนตัว**จากการวิจัยได้ทุกขณะ โดยไม่ต้องให้เหตุผล และการปฏิเสธที่จะเข้าร่วมหรือถอนตัวจากการวิจัยครั้งนี้ไม่มีผลต่อการได้รับการบริการจากเจ้าหน้าที่แต่ประการใด

9. หากท่านมีข้อสงสัยให้สอบถามเพิ่มเติมได้โดยสามารถติดต่อผู้วิจัยได้ตลอดเวลา และหากผู้วิจัยมีข้อมูลเพิ่มเติมที่เป็นประโยชน์หรือโทษเกี่ยวกับการวิจัย ผู้วิจัยจะแจ้งให้ท่านทราบอย่างรวดเร็ว **เพื่อให้ผู้มีส่วนร่วมในการวิจัยทบทวนว่ายังสมัครใจจะอยู่ในงานวิจัยต่อไปหรือไม่**

10. ข้อมูลที่เกี่ยวข้องกับท่านจะถูกเก็บเป็น**ความลับ** หากมีการเสนอผลการวิจัยจะเสนอเป็นภาพรวม ข้อมูลใดที่สามารถระบุถึงตัวท่านได้จะไม่ปรากฏในรายงาน เมื่อเสร็จสิ้นการวิจัยแล้วข้อมูลที่เกี่ยวข้องกับผู้มีส่วนร่วมในการวิจัยในแบบสอบถามและแบบติดตามภาวะสุขภาพจะถูกทำลาย

11. การวิจัยในครั้งนี้ไม่มีการจ่ายค่าตอบแทนให้แก่ผู้ที่เข้าร่วมการวิจัย แต่จะมีการเลี้ยงอาหารว่างในวันที่เข้าอบรม

12. “หากท่านไม่ได้รับการปฏิบัติตามข้อมูลดังกล่าวสามารถร้องเรียนได้ที่ คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย 254 อาคารจามจุรี 1 ชั้น 2 ถนนพญาไท เขตปทุมวัน กรุงเทพฯ 10330 โทรศัพท์/โทรสาร 0-2218-3202 E-mail: eccu@chula.ac.th”

**ข้อมูลสำหรับกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย**
**(กลุ่มที่ 2 คือ กลุ่มที่ได้รับโปรแกรมการจัดการตนเอง)**
**(Participant information sheet)**


**ชื่อโครงการวิจัย** "ผลของโปรแกรมส่งเสริมการจัดการตนเองต่อระดับความดันโลหิตและดัชนีมวลกายของ ผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน"

**ชื่อผู้วิจัย** นางสาวธิดา ทองวิเชียร

**ตำแหน่ง** นิสิตคณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

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ข้อมูลที่เกี่ยวข้องกับการให้ความยินยอมในการวิจัยประกอบด้วยคำอธิบาย ดังต่อไปนี้

1. ขอเรียนเชิญท่านเข้าร่วมในการวิจัยก่อนที่ท่านจะตัดสินใจเข้าร่วมในการวิจัย มีความจำเป็นที่ท่านควรทำความเข้าใจว่างานวิจัยนี้ทำเพราะเหตุใด และเกี่ยวข้องกับอะไร กรุณาใช้เวลาในการอ่านข้อมูลต่อไปนี้อย่างละเอียดรอบคอบ และสอบถามข้อมูลเพิ่มเติมหรือข้อมูลที่ไม่ชัดเจนได้ตลอดเวลา

2. โครงการวิจัยนี้เป็นการวิจัยเชิงทดลองเพื่อศึกษาเกี่ยวกับผลของโปรแกรมส่งเสริมการจัดการตนเองต่อระดับความดันโลหิตและดัชนีมวลกายของผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน

3. วัตถุประสงค์ของการวิจัย

3.1 เพื่อเปรียบเทียบความดันโลหิตและดัชนีมวลกายของผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วนก่อนและหลังเข้าร่วมโปรแกรมการจัดการตนเอง

3.2 เปรียบเทียบความดันโลหิตและดัชนีมวลกายของผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วนระหว่างกลุ่มที่ได้รับโปรแกรมการจัดการตนเองและกลุ่มที่ได้รับการพยาบาลตามปรกติ

4. ประชากรและกลุ่มตัวอย่างในงานวิจัย คือ ผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน ท่านได้รับการคัดเลือกเป็นกลุ่มตัวอย่าง โดยการสุ่มอย่างง่าย (simple random) ) ซึ่งงานวิจัยนี้ใช้กลุ่มตัวอย่างจำนวน 66 คน แบ่งเป็น 2 กลุ่ม (กลุ่มที่ได้รับการพยาบาลตามปรกติ-กลุ่มที่1 และกลุ่มที่ได้รับโปรแกรมการจัดการตนเอง-กลุ่มที่ 2) กลุ่มละ 33 คน โดยมีเกณฑ์การคัดเลือกเข้าเป็นกลุ่มตัวอย่างและเกณฑ์การคัดออกจากการเป็นกลุ่มตัวอย่าง ดังนี้

4.1 เกณฑ์การคัดเข้าเป็นกลุ่มตัวอย่าง

1) อายุ 35-59 ปี ทั้งเพศชายและหญิง
2) ความดันโลหิต 120-139/80-89 มม.ปรอท
3) ดัชนีมวลกายตั้งแต่ 25 กก./เมตร$^2$
4) ไม่เคยได้รับยารักษาโรคความดันโลหิตสูง
5) สามารถติดต่อสื่อสาร อ่าน และเขียนภาษาไทยได้
6) ยินดีเข้าร่วมการวิจัย

4.2 เกณฑ์การคัดออกจากการเป็นกลุ่มตัวอย่าง

1) เข้าร่วมกิจกรรมไม่ครบตามที่กำหนดไว้ คือ ครั้งที่ 1 ครั้งที่ 2 และครั้งที่ 3

5. ขั้นตอนการดำเนินงานวิจัย

5.1 ท่านจะได้รับแบบสอบถามจำนวน 1 ชุด ได้แก่ แบบสอบถามข้อมูลส่วนบุคคล ข้อมูลภาวะสุขภาพ และพฤติกรรมเสี่ยงต่อการเกิดโรคความดันโลหิตสูง จำนวนทั้งหมด 14 ข้อ ซึ่งเป็นการตอบแบบสอบถามด้วยตนเอง ใช้เวลาประมาณ 15 นาที ณ โรงพยาบาลส่งเสริมสุขภาพ

5.2 หลังตอบแบบสอบถาม ท่านจะได้รับการประเมินสมรรถภาพทางกายจากผู้วิจัย ได้แก่ ความดันโลหิต ชีพจร น้ำหนัก ส่วนสูง ดัชนีมวลกาย เส้นรอบเอว การทดสอบก้าวขึ้นลงเป็นจังหวะ 3 นาที การทดสอบยืนและนั่งบนเก้าอี้ และการทดสอบนั่งงอตัว ใช้เวลาประมาณ 15 นาที ณ โรงพยาบาลส่งเสริมสุขภาพ

5.3 หลังจากท่านได้รับการประเมินสมรรถภาพทางกาย ท่านจะได้รับความรู้และฝึกทักษะการจัดการตนเองเพื่อป้องกันโรคความดันโลหิตสูง (90 นาที) จากผู้วิจัย ณ โรงพยาบาลส่งเสริมสุขภาพ ดังนี้

5.3.1 ได้รับความรู้เกี่ยวกับภาวะก่อนความดันโลหิตสูงและโรคความดันโลหิตสูง ได้แก่ ชนิด ปัจจัยเสี่ยง อาการ ภาวะแทรกซ้อน และการรักษาโรคความดันโลหิตสูง เป็นระยะเวลา 30 นาที

5.3.2 หลังจากนั้นท่านจะได้รับความรู้และการฝึกทักษะการจัดการตนเองเพื่อป้องกันโรคความดันโลหิตสูงด้านการรับประทานอาหาร (30 นาที) และด้านการออกกำลังกาย (30 นาที)

5.3.3 ผู้เข้าร่วมโครงการจะได้รับคู่มือการจัดการตนเองสำหรับผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน จำนวน 4 เล่ม ประกอบด้วย โรคความดันโลหิตสูง อาหารต้านความดันโลหิต การออกกำลังกาย และสมุดบันทึกพฤติกรรมการรับประทานอาหารและการออกกำลังกาย

5.3.4 หลังจากที่ท่านได้รับความรู้และฝึกทักษะการจัดการตนเองจนสามารถปฏิบัติได้ถูกต้องแล้ว ท่านจะต้องกลับไปจัดการตนเองด้านการรับประทานอาหารและการออกกำลังกาย พร้อมทั้งบันทึกพฤติกรรมทั้ง 2 ด้านดังกล่าวลงในสมุดบันทึกพฤติกรรม เป็นระยะเวลา 1 สัปดาห์

5.3.5 ในสัปดาห์ต่อมา ผู้วิจัยขอนัดท่านเพื่อแลกเปลี่ยนประสบการณ์ในการจัดการตนเองด้านการรับประทานอาหารและการออกกำลังกาย และเปิดโอกาสให้ซักถามข้อสงสัยหรืออุปสรรคต่างๆ ที่มีผลต่อพฤติกรรมการรับประทานอาหารและออกกำลังกาย ใช้เวลาประมาณ 60 นาที

5.3.6 หลังจากนั้นผู้เข้าร่วมโครงการจะได้รับการติดตามด้วยโทรศัพท์ จำนวน 4 ครั้ง คือสัปดาห์ที่ 2 สัปดาห์ที่ 3 สัปดาห์ที่ 6 และสัปดาห์ที่ 10 และติดตามด้วยการเยี่ยมบ้าน จำนวน 2 ครั้ง คือสัปดาห์ที่ 4 และสัปดาห์ที่ 8 เพื่อทบทวนความรู้ กระตุ้นเตือนให้รับประทานอาหารตามสัดส่วนที่กำหนดไว้และออกกำลังกายอย่างน้อย 5-7 วันต่อสัปดาห์ และเปิดโอกาสให้ซักถามข้อสงสัยหรืออุปสรรคต่างๆ ที่มีผลต่อพฤติกรรมการรับประทานอาหารและออกกำลังกาย

5.4 ในสัปดาห์ที่ 12 หลังจากสิ้นสุดโปรแกรมในข้อ 5.1 5.2 และ 5.3 ผู้วิจัยขอเชิญท่านเข้าร่วมกิจกรรมแลกเปลี่ยนประสบการณ์เพื่อประเมินผลการเข้าร่วมโครงการและประเมินภาวะสุขภาพอีกครั้ง ใช้เวลาประมาณ 60 นาที ณ โรงพยาบาลส่งเสริมสุขภาพ

5.4.1 ท่านจะได้รับการประเมินสมรรถภาพทางกาย ได้แก่ ความดันโลหิต ชีพจร น้ำหนัก ส่วนสูง ดัชนีมวลกาย การทดสอบก้าวขึ้นลงเป็นจังหวะ 3 นาที การทดสอบยืนและนั่งบนเก้าอี้ และการทดสอบนั่งงอตัว (15 นาที)

5.4.2 พูดคุยแลกเปลี่ยนประสบการณ์การจัดการตนเองเพื่อป้องกันโรคความดันโลหิตสูง รวมถึงปัญหาและอุปสรรคหลังจากที่ได้รับความรู้และฝึกทักษะการจัดการตนเอง (20 นาที)

5.4.3 ผู้วิจัยทบทวนเรื่องพฤติกรรมการป้องกันโรคความดันโลหิตสูง และสรุปปิดโครงการ (10 นาที)

6. ในการวิจัยครั้งนี้ใช้ข้อมูลการคัดกรองกลุ่มเสี่ยงโรคความดันโลหิตสูงโดยได้รับการอนุมัติจากผู้อำนวยการโรงพยาบาลส่งเสริมสุขภาพตำบล

7. การเข้าร่วมการวิจัยในครั้งนี้อาจทำให้ท่านเกิดอาการอ่อนเพลียขณะที่ท่านตอบแบบสอบถาม ท่านสามารถพักระหว่างตอบแบบสอบถามได้ สำหรับการเข้าร่วมโปรแกรม ท่านอาจเกิดอาการอ่อนเพลียบ้าง เมื่อท่านปฏิบัติตามโปรแกรมจะไม่เกิดอันตรายร้ายแรงกับท่าน เนื่องจากโปรแกรมนี้ได้ผ่านการศึกษาค้นคว้ามาเป็นอย่างดี และผ่านการตรวจสอบจากผู้เชี่ยวชาญทางด้านการดูแลผู้ป่วยโรคความดันโลหิตสูง โภชนาการ และการออกกำลังกาย รวมทั้งหมดจำนวน 5 ท่าน กรณีที่ท่านมีอาการผิดปกติระหว่างการเข้าร่วมการศึกษาวิจัยนี้ ท่านจะได้รับการดูแลช่วยเหลือปฐมพยาบาลเบื้องต้นจากผู้วิจัย และส่งต่อไปยังโรงพยาบาลส่งเสริมสุขภาพเพื่อให้การดูแลต่อไป

8. การเข้าร่วมการวิจัยในครั้งนี้มีประโยชน์ต่อผู้เข้าร่วมโครงการ คือผู้เข้าร่วมโครงการได้รับความรู้จากผู้วิจัยเกี่ยวกับโรคความดันโลหิตสูง สาเหตุ ปัจจัยเสี่ยง อาการ และพฤติกรรมการรับประทานอาหารและการออกกำลังกาย เพื่อส่งเสริมให้ผู้เข้าร่วมโครงการสามารถจัดการตนเองเพื่อลดความดันโลหิต และดัชนีมวลกายได้

9. การเข้าร่วมในการวิจัยของท่านเป็นโดย**สมัครใจ** และสามารถ**ปฏิเสธ**ที่จะเข้าร่วมหรือ**ถอนตัว**จากการวิจัยได้ทุกขณะ โดยไม่ต้องให้เหตุผล และการปฏิเสธที่จะเข้าร่วมหรือถอนตัวจากการวิจัยครั้งนี้ไม่มีผลต่อการได้รับการบริการจากเจ้าหน้าที่แต่ประการใด

10. หากท่านมีข้อสงสัยให้สอบถามเพิ่มเติมได้โดยสามารถติดต่อผู้วิจัยได้ตลอดเวลา และหากผู้วิจัยมีข้อมูลเพิ่มเติมที่เป็นประโยชน์หรือโทษเกี่ยวกับการวิจัย ผู้วิจัยจะแจ้งให้ท่านทราบอย่างรวดเร็ว **เพื่อให้ผู้มีส่วนร่วมในการวิจัยทบทวนว่ายังสมัครใจจะอยู่ในงานวิจัยต่อไปหรือไม่**

11. ข้อมูลที่เกี่ยวข้องกับท่านจะถูกเก็บเป็น**ความลับ** หากมีการเสนอผลการวิจัยจะเสนอเป็นภาพรวม ข้อมูลใดที่สามารถระบุถึงตัวท่านได้จะไม่ปรากฏในรายงาน เมื่อเสร็จสิ้นการวิจัยแล้วข้อมูลที่เกี่ยวข้องกับผู้มีส่วนร่วมในการวิจัยในแบบสอบถามและแบบติดตามภาวะสุขภาพจะถูกทำลาย

12. การวิจัยในครั้งนี้ไม่มีการจ่ายค่าตอบแทนให้แก่ผู้ที่เข้าร่วมการวิจัย แต่จะมีการเลี้ยงอาหารว่างในวันที่เข้าอบรม

13. “หากท่านไม่ได้รับการปฏิบัติตามข้อมูลดังกล่าวสามารถร้องเรียนได้ที่ คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย 254 อาคารจามจุรี 1 ชั้น 2 ถนนพญาไท เขตปทุมวัน กรุงเทพฯ 10330 โทรศัพท์/โทรสาร 0-2218-3202 E-mail: eccu@chula.ac.th”

**หนังสือแสดงความยินยอมเข้าร่วมการวิจัย**

**(กลุ่มที่ 1 คือ กลุ่มที่ได้รับการพยาบาลตามปรกติ)**

ทำที่.....

วันที่.....เดือน.....พ.ศ. .....

**เลขที่** ประชากรตัวอย่างหรือผู้มีส่วนร่วมในการวิจัย.....

ข้าพเจ้า ซึ่งได้ลงนามท้ายหนังสือนี้ ขอแสดงความยินยอมเข้าร่วมโครงการวิจัย

**ชื่อโครงการวิจัย** “ผลของโปรแกรมการจัดการตนเองต่อระดับความดันโลหิตและดัชนีมวลกายของผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน”

**ชื่อผู้วิจัย** นางสาวธิดา ทองวิเชียร

**ที่อยู่ที่ติดต่อ** คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย อาคารบรมราชชนนีศรีศตพรรษ ชั้น 11 ถนนพระราม1 ปทุมวัน กทม. 10330 หรือ 7/297 ถนนเลียบคลองทวีวัฒนา แขวงศาลาธรรมสพน์ เขตทวีวัฒนา กทม. 10170 .โทรศัพท์ 082 335 8676

ข้าพเจ้า **ได้รับทราบ**รายละเอียดเกี่ยวกับที่มาและวัตถุประสงค์ในการทำวิจัย รายละเอียดขั้นตอนต่างๆ ที่จะต้องปฏิบัติหรือได้รับการปฏิบัติ ความเสี่ยง/อันตราย และประโยชน์ซึ่งจะเกิดขึ้นจากการวิจัยเรื่องนี้ โดยได้อ่านรายละเอียดในเอกสารชี้แจงผู้เข้าร่วมการวิจัยโดยตลอด และ**ได้รับคำอธิบาย**จากผู้วิจัย **จนเข้าใจเป็นอย่างดี**แล้ว

ข้าพเจ้าจึง**สมัครใจ**เข้าร่วมในโครงการวิจัยนี้ ภายใต้เงื่อนไขที่ระบุไว้ในเอกสารชี้แจงแก่ผู้เข้าร่วมการวิจัย โดยข้าพเจ้ายินยอมเข้าร่วมการวิจัย เป็นจำนวน 2 ครั้ง คือครั้งที่ 1 คือ สัปดาห์แรก และสัปดาห์ที่ 12 และข้าพเจ้ายินดีตอบแบบสอบถามจำนวน 1 ชุด ได้แก่ แบบสอบถามข้อมูลส่วนบุคคล ข้อมูลภาวะสุขภาพ และพฤติกรรมเสี่ยงต่อการเกิดโรคความดันโลหิตสูง (15 นาที) รวมทั้งยินยอมรับการประเมินสมรรถภาพทางกาย ได้แก่ ความดันโลหิต ชีพจร น้ำหนัก ส่วนสูง ดัชนีมวลกาย การทดสอบก้าวขึ้นลงเป็นจังหวะ 3 นาที การทดสอบยืนและนั่งบนเก้าอี้ และการทดสอบนั่งงอตัว (15 นาที) และเข้าอบรมความรู้เพื่อป้องกันโรคความดันโลหิตสูง (90 นาที)

ข้าพเจ้ามีสิทธิ**ถอนตัว**ออกจากการวิจัยเมื่อใดก็ได้ตามความประสงค์ **โดยไม่ต้องแจ้งเหตุผล** ซึ่งการถอนตัวออกจากการวิจัยนั้น จะไม่มีผลกระทบในทางใดๆ ต่อข้าพเจ้าทั้งสิ้น รวมทั้งไม่มีไม่มีผลกระทบต่อการได้รับการบริการจากเจ้าหน้าที่ของโรงพยาบาลส่งเสริมสุขภาพแต่ประการใด

ข้าพเจ้าได้รับคำรับรองว่า ผู้วิจัยจะปฏิบัติต่อข้าพเจ้าตามข้อมูลที่ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย และข้อมูลใดๆ ที่เกี่ยวข้องกับข้าพเจ้า ผู้วิจัยจะ**เก็บรักษาเป็นความลับ** โดยจะนำเสนอข้อมูลการวิจัยเป็นภาพรวมเท่านั้น ไม่มีข้อมูลใดในการรายงานที่จะนำไปสู่การระบุตัวข้าพเจ้า

**หากข้าพเจ้าไม่ได้รับการปฏิบัติตรงตามที่ได้ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย** ข้าพเจ้าสามารถร้องเรียนได้ที่คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1

จุฬาลงกรณ์มหาวิทยาลัย 254 อาคารจามจุรี 1 ชั้น 2 ถนนพญาไท เขตปทุมวัน กรุงเทพฯ 10330
โทรศัพท์/โทรสาร 0-2218-3202 **E-mail: eccu@chula.ac.th**

ข้าพเจ้าได้ลงลายมือชื่อไว้เป็นสำคัญต่อหน้าพยาน ทั้งนี้ข้าพเจ้าได้รับสำเนาเอกสารชี้แจงผู้เข้าร่วมการวิจัย และสำเนาหนังสือแสดงความยินยอมไว้แล้ว

ลงชื่อ.....
( นางสาวธิดา ทองวิเชียร )
ผู้วิจัยหลัก

ลงชื่อ.....
(.....)
ผู้มีส่วนร่วมในการวิจัย

ลงชื่อ.....
(.....)
พยาน

**หนังสือแสดงความยินยอมเข้าร่วมการวิจัย**

**(กลุ่มที่ 2 คือ กลุ่มที่ได้รับโปรแกรมการจัดการตนเอง)**

ทำที่.....

วันที่.....เดือน.....พ.ศ. .....

**เลขที่** ประชากรตัวอย่างหรือผู้มีส่วนร่วมในการวิจัย.....

ข้าพเจ้า ซึ่งได้ลงนามท้ายหนังสือนี้ ขอแสดงความยินยอมเข้าร่วมโครงการวิจัย

**ชื่อโครงการวิจัย** “ผลของโปรแกรมการจัดการตนเองต่อระดับความดันโลหิตและดัชนีมวลกายของผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน”

**ชื่อผู้วิจัย** นางสาวธิดา ทองวิเชียร

**ที่อยู่ที่ติดต่อ** คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย อาคารบรมราชชนนีศรีศตพรรษ ชั้น 11 ถนนพระราม1 ปทุมวัน กทม. 10330 หรือ 7/297 ถนนเลียบคลองทวีวัฒนา แขวงศาลาธรรมสพน์ เขตทวีวัฒนา กทม. 10170 โทรศัพท์ 082 335 8676

ข้าพเจ้า **ได้รับทราบ**รายละเอียดเกี่ยวกับที่มาและวัตถุประสงค์ในการทำวิจัย รายละเอียดขั้นตอนต่างๆ ที่จะต้องปฏิบัติหรือได้รับการปฏิบัติ ความเสี่ยง/อันตราย และประโยชน์ซึ่งจะเกิดขึ้นจากการวิจัยเรื่องนี้ โดยได้อ่านรายละเอียดในเอกสารชี้แจงผู้เข้าร่วมการวิจัยโดยตลอด และ**ได้รับคำอธิบาย**จากผู้วิจัย **จนเข้าใจเป็นอย่างดี**แล้ว

ข้าพเจ้าจึง**สมัครใจ**เข้าร่วมในโครงการวิจัยนี้ ภายใต้เงื่อนไขที่ระบุไว้ในเอกสารชี้แจงแก่ผู้เข้าร่วม การวิจัยโดยข้าพเจ้ายินยอมเข้าร่วมการวิจัย เป็นจำนวน 3 ครั้ง คือ สัปดาห์ที่ 1 สัปดาห์ที่ 2 และสัปดาห์ที่ 12 และข้าพเจ้ายินดีตอบแบบสอบถามจำนวน 1 ชุด ได้แก่ แบบสอบถามข้อมูลส่วนบุคคล ข้อมูลภาวะสุขภาพ และพฤติกรรมเสี่ยงต่อการเกิดโรคความดันโลหิตสูง (15 นาที) รวมทั้งยินยอมรับการประเมินสมรรถภาพทางกาย ได้แก่ ความดันโลหิต ชีพจร น้ำหนัก ส่วนสูง ดัชนีมวลกาย เส้นรอบเอว การทดสอบก้าวขึ้นลงเป็นจังหวะ 3 นาที การทดสอบยืนและนั่งบนเก้าอี้ และการทดสอบนั่งงอตัว (15 นาที) เข้าอบรมความรู้และฝึกทักษะการจัดการตนเองเพื่อป้องกันโรคความดันโลหิตสูง (90 นาที) การติดตามด้วยโทรศัพท์ จำนวน 4 ครั้ง คือสัปดาห์ที่ 2 สัปดาห์ที่ 3 สัปดาห์ที่ 6 และสัปดาห์ที่ 10 และติดตามด้วยการเยี่ยมบ้าน จำนวน 2 ครั้ง คือสัปดาห์ที่ 4 และสัปดาห์ที่ 8

ข้าพเจ้าได้ทราบว่า ข้าพเจ้ามีสิทธิ**ถอนตัว**ออกจากการวิจัยเมื่อใดก็ได้ตามความประสงค์ **โดยไม่ต้องแจ้งเหตุผล** ซึ่งการถอนตัวออกจากการวิจัยนั้น จะไม่มีผลกระทบในทางใดๆ ต่อข้าพเจ้าทั้งสิ้น รวมทั้งไม่มีไม่มีผลกระทบต่อการได้รับการบริการจากเจ้าหน้าที่ของโรงพยาบาลส่งเสริมสุขภาพแต่ประการใด

ข้าพเจ้าได้รับคำรับรองว่า ผู้วิจัยจะปฏิบัติต่อข้าพเจ้าตามข้อมูลที่ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย และข้อมูลใดๆ ที่เกี่ยวข้องกับข้าพเจ้า ผู้วิจัยจะ**เก็บรักษาเป็นความลับ** โดยจะนำเสนอข้อมูลการวิจัยเป็นภาพรวมเท่านั้น ไม่มีข้อมูลใดในการรายงานที่จะนำไปสู่การระบุตัวข้าพเจ้า

**หากข้าพเจ้าไม่ได้รับการปฏิบัติตรงตามที่ได้ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย** ข้าพเจ้าสามารถร้องเรียนได้ที่คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย 254 อาคารจามจุรี 1 ชั้น 2 ถนนพญาไท เขตปทุมวัน กรุงเทพฯ 10330 โทรศัพท์/โทรสาร 0-2218-3202 **E-mail: eccu@chula.ac.th**

ข้าพเจ้าได้ลงลายมือชื่อไว้เป็นสำคัญต่อหน้าพยาน ทั้งนี้ข้าพเจ้าได้รับสำเนาเอกสารชี้แจงผู้เข้าร่วมการวิจัย และสำเนาหนังสือแสดงความยินยอมไว้แล้ว

ลงชื่อ..... ลงชื่อ.....

( นางสาวธิดา ทองวิเชียร ) (.....)

ผู้วิจัยหลัก ผู้มีส่วนร่วมในการวิจัย

ลงชื่อ.....

(.....)

พยาน

# APPENDIX D

## Personal information sheet

**แบบสอบถามข้อมูลส่วนบุคคล ภาวะสุขภาพ และพฤติกรรมเสี่ยงต่อการเกิดโรคความดันโลหิตสูง**

**ส่วน1 ข้อมูลทั่วไป**

**คำชี้แจง**: แบบสอบถามข้อมูลส่วนบุคคลด้านข้อมูลทั่วไป มีวัตถุประสงค์เพื่อประเมินข้อมูลพื้นฐานเกี่ยวกับตัวท่าน กรุณาตอบแบบสอบถามโดยทำเครื่องหมาย (✓) ลงในช่องว่าง ❑ หน้าข้อความที่ตรงกับความเป็นจริงเกี่ยวกับตัวท่านมากที่สุด หรือเติมคำลงในช่องว่างที่ตรงกับข้อมูลที่เป็นจริงของท่านตามข้อคำถามที่กำหนดให้

1. เพศ ❑ ชาย ❑ หญิง
2. ปัจจุบันท่านอายุ.....ปี.....เดือน
3. สถานภาพสมรส ❑ โสด ❑ คู่ ❑ หม้าย ❑ หย่า/แยก
   ❑ อื่นๆ โปรดระบุ.....
4. ระดับการศึกษาตอนต้น ❑ ไม่ได้ศึกษา ❑ประถมศึกษา ❑ มัธยมศึกษา
   ❑ มัธยมศึกษาตอนปลาย/ปวช. ❑ อนุปริญญา/ปวส.
   ❑ ปริญญาตรี ❑ อื่นๆ โปรดระบุ.....
5. อาชีพรัฐวิสาหกิจ ❑ ว่างงาน ❑ เกษตรกร ❑ รับราชการ/
   ❑ รับจ้าง ❑ พนักงานบริษัท ❑ค้าขาย/ธุรกิจส่วนตัว
   ❑ อื่นๆ โปรดระบุ.....
6. ท่านมีพ่อ แม่ หรือญาติพี่น้องสายตรงป่วยเป็นโรคความดันโลหิตสูงหรือไม่
   ❑ ไม่มี
   ❑ มี โปรดระบุ.....
7. โรคประจำตัว ❑ ไม่มี
   ❑ มี โปรดระบุ ❑ โรคหัวใจและหลอดเลือด
   ❑ โรคเนื้องอกต่อมหมวกไต
   ❑ โรคไตวาย
   ❑ โรคเบาหวาน
   ❑ ภาวะไขมันในเลือดสูง
   ❑ อื่นๆ โปรดระบุ.....

# APPENDIX E

## The automatic blood pressure monitor




**The automatic blood pressure monitor** (Omron model HEM7130)

# APPENDIX F

## The automatic weight scale




**The Automatic weight scale** (OMRON model HBF 214)

# APPENDIX G

## The portable stadiometer



**The Portable Stadiometer**

# APPENDIX H

## Program manual

# คู่มือ
# โปรแกรมการจัดการตนเอง
# สำหรับผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน

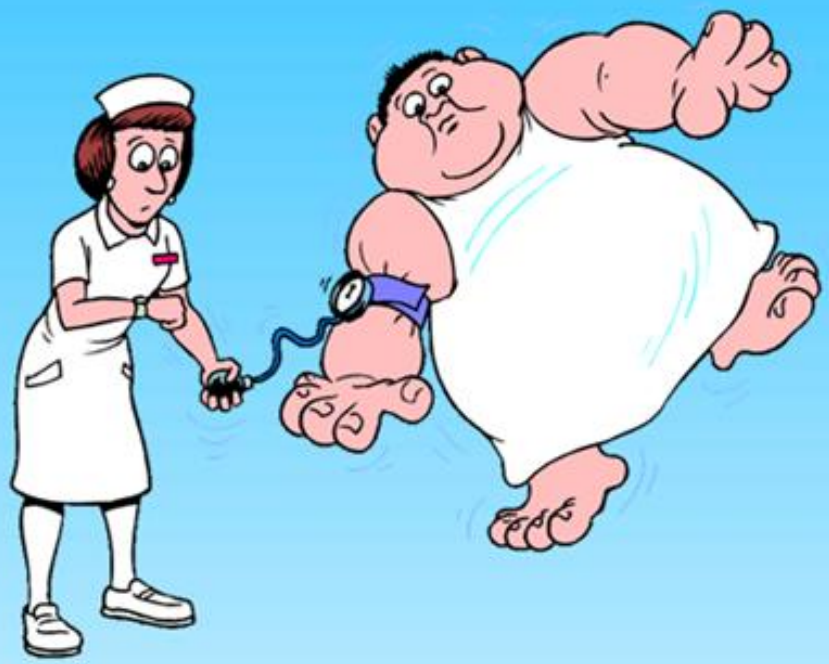
เนื้อหา

1. หลักการและเหตุผล
2. วัตถุประสงค์
3. กลุ่มเป้าหมาย
4. องค์ประกอบหลักของโปรแกรม
5. ขั้นตอนการดำเนินกิจกรรมในโปรแกรม
6. เอกสารประกอบขั้นตอนการดำเนินกิจกรรมในโปรแกรม
   - 6.1 แผนการสอนเรื่องโรคความดันโลหิตสูง
   - 6.2 แผนการสอนเรื่องการจัดการตนเองด้านการรับประทานอาหารสำหรับผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน
   - 6.3 แผนการสอนเรื่องการจัดการตนเองด้านการออกกำลังกายสำหรับผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน

# APPENDIX I

## Booklets

# คู่มือ โรคความดันโลหิตสูง
# สำหรับผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน



จัดทำโดย

นางสาวธิดา ทองวิเชียร

นิสิตหลักสูตรพยาบาลศาสตรดุษฎีบัณฑิต คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

อาจารย์ที่ปรึกษาหลัก รศ. ร.ต.อ.หญิง ดร. ยุพิน อังสุโรจน์

อาจารย์ที่ปรึกษาร่วม ผศ. ดร. สุนิดา ปรีชาวงษ์

# คู่มือการรับประทานอาหารเพื่อสุขภาพ สำหรับผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน

จัดทำโดย

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# คู่มือการออกกำลังกาย
# สำหรับผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน

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# APPENDIX J

## Diary

# คู่มือการจัดการตนเอง
# และแบบบันทึกพฤติกรรมการจัดการตนเอง
# สำหรับผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน


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# APPENDIX K

## The self-management knowledge test to prevent hypertension

แบบประเมินความรู้เรื่องการจัดการตนเองเพื่อป้องกันโรคความดันโลหิตสูง

คำชี้แจง แบบประเมินความรู้ชุดนี้มีวัตถุประสงค์เพื่อประเมินความรู้และความเข้าใจเรื่องการจัดการตนเองเพื่อป้องกันโรคความดันโลหิตสูงของผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน โปรดอ่านข้อความและเติมเครื่องหมาย ✓ลงในช่องข้อความที่ตรงกับความคิดเห็นของท่านมากที่สุด โปรดตอบคำถามทุกข้อ

| ลำดับที่ | ข้อคำถาม | ใช่ | ไม่ใช่ |
|---|---|---|---|
| ความรู้เกี่ยวกับโรคความดันโลหิตสูง | | | |
| 1. | ความดันโลหิตสูง คือ ความดันโลหิตตั้งแต่ 140/90 มม.ปรอท | | |
| . | | | |
| . | | | |
| . | | | |
| 10 | ผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วนควรเฝ้าระวังความดันโลหิตของตนเองเป็นระยะ | | |
| การจัดการตนเองด้านการรับประทานอาหาร | | | |
| 11. | โดยปกติผู้ชายและผู้หญิงต้องการพลังงานวันละ 2,000 กิโลแคลอรี | | |
| . | | | |
| . | | | |
| . | | | |
| 20. | ควรงดดื่มเครื่องดื่มที่มีส่วนผสมของแอลกอฮอล์ | | |
| การจัดการตนเองด้านการออกกำลังกาย | | | |
| 21. | การออกกำลังกายเป็นอย่างสม่ำเสมอช่วยป้องกันการเกิดโรคความดันโลหิตสูง | | |
| . | | | |
| . | | | |
| . | | | |
| 30. | ผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วนควรหลีกเลี่ยงการออกกำลังกายแบบมีแรงต้าน เช่น การยกน้ำหนัก ยางยืด | | |

# APPENDIX L

## The self-management knowledge's score in the experimental group

| ID | Pretest | Posttest |
|---|---|---|
| 1 | 25 | 29 |
| 2 | 23 | 28 |
| 3 | 19 | 25 |
| 4 | 27 | 30 |
| 5 | 29 | 30 |
| 6 | 30 | 30 |
| 7 | 27 | 30 |
| 8 | 25 | 27 |
| 9 | 21 | 25 |
| 10 | 28 | 30 |
| 11 | 26 | 27 |
| 12 | 17 | 25 |
| 13 | 26 | 29 |
| 14 | 29 | 30 |
| 15 | 27 | 29 |
| 16 | 25 | 27 |
| 17 | 24 | 25 |

| ID | Pretest | Posttest |
|---|---|---|
| 18 | 17 | 25 |
| 19 | 16 | 28 |
| 20 | 5 | 25 |
| 21 | 12 | 27 |
| 22 | 26 | 28 |
| 23 | 28 | 28 |
| 24 | 27 | 29 |
| 25 | 23 | 26 |
| 26 | 16 | 25 |
| 27 | 12 | 25 |
| 28 | 18 | 27 |
| 29 | 30 | 30 |
| 30 | 27 | 29 |
| 31 | 30 | 30 |
| 32 | 22 | 25 |
| 33 | 21 | 26 |



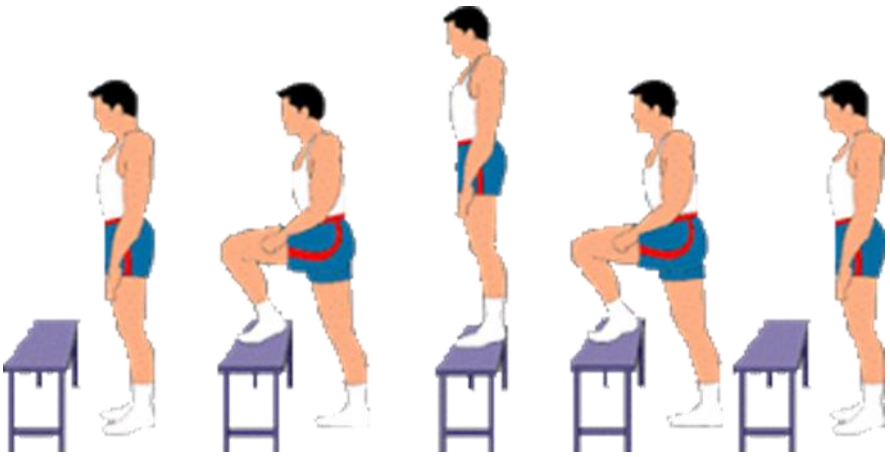
| Scores | Pretest | Posttest |
|---|---|---|
| Min-Max | 5-30 | 25-30 |
| Mean | 22.97 | 27.67 |
| SD | 6.06 | 2.00 |


APPENDIX M

Physical fitness record

แบบประเมินสมรรถภาพทางกาย

| รายการประเมิน | ครั้งที่1..... | ครั้งที่2..... | หน่วยวัด |
|---|---|---|---|
| ความดันโลหิต | ...../..... | ...../..... | มิลลิเมตรปรอท |
| ชีพจร | | | ครั้ง/นาที |
| การประเมินองค์ประกอบของร่างกาย (body composition assessment) | | | |
| น้ำหนัก | | | กิโลกรัม |
| ส่วนสูง | | | เซนติเมตร |
| ค่าดัชนีมวลกาย | | | กิโลกรัม/เมตร$^2$ |
| เส้นรอบเอว | | | เซนติเมตร |
| การประเมินสมรรถภาพระบบหายใจและหลอดเลือด (cardio respiratory fitness assessments) | | | |
| ก้าวเป็นจังหวะ 3 นาที (3 minutes step test) | | | อัตราการเต้นของหัวใจต่อนาที |
| การประเมินสมรรถภาพความแข็งแรงของกล้ามเนื้อ (muscular endurance assessment) | | | |
| การยืนและนั่งบนเก้าอี้ (60 seconds chair stand) | | | ครั้ง/นาที |
| การประเมินความยืดหยุ่นของกล้ามเนื้อและข้อต่อ (flexibility assessments) | | | |
| นั่งงอตัวไปข้างหน้า (Sit and Reach) | | | เซนติเมตร |



3 minutes step test

60 seconds chair stand test

Sit and Reach Test

# APPENDIX N
## Assumption test

**One-Sample Kolmogorov-Smirnov Test**

| Group | | | PreSBP | PreDBP | PreBMI | Post SBP | Post DBP | Post BMI |
|---|---|---|---|---|---|---|---|---|
| Self-management program | N | | 33 | 33 | 33 | 33 | 33 | 33 |
| | Normal Parameters[a,b] | Mean | 131.21 | 82.39 | 28.2588 | 122.45 | 78.21 | 27.2358 |
| | | Std. Deviation | 5.650 | 5.771 | 2.96239 | 7.400 | 5.931 | 2.88696 |
| | Most Extreme Differences | Absolute | .173 | .129 | .233 | .155 | .166 | .193 |
| | | Positive | .137 | .126 | .233 | .099 | .155 | .193 |
| | | Negative | -.173 | -.129 | -.143 | -.155 | -.166 | -.144 |
| | Kolmogorov-Smirnov Z | | .994 | .740 | 1.340 | .889 | .952 | 1.108 |
| | Asymp. Sig. (2-tailed) | | .277 | .645 | .055 | .408 | .325 | .172 |
| Usual program | N | | 32 | 32 | 32 | 32 | 32 | 32 |
| | Normal Parameters[a,b] | Mean | 129.41 | 82.06 | 28.3078 | 131.06 | 82.69 | 28.4612 |
| | | Std. Deviation | 5.297 | 4.996 | 2.31178 | 8.148 | 5.981 | 2.35486 |
| | Most Extreme Differences | Absolute | .118 | .197 | .114 | .111 | .110 | .157 |
| | | Positive | .106 | .090 | .114 | .097 | .101 | .157 |
| | | Negative | -.118 | -.197 | -.088 | -.111 | -.110 | -.109 |
| | Kolmogorov-Smirnov Z | | .669 | 1.115 | .645 | .626 | .625 | .886 |
| | Asymp. Sig. (2-tailed) | | .762 | .167 | .799 | .828 | .829 | .412 |

a. Test distribution is Normal.

b. Calculated from data.

Pair t-test for the Experimental and control group at pretest and posttest

Paired Samples Statistics

| Group | | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|---|
| The SMPP | Pair 1 | PreSBP | 131.21 | 33 | 5.650 | .984 |
| | | Post SBP | 122.45 | 33 | 7.400 | 1.288 |
| | Pair 2 | PreDBP | 82.39 | 33 | 5.771 | 1.005 |
| | | Post DBP | 78.21 | 33 | 5.931 | 1.032 |
| | Pair 3 | PreBMI | 28.26 | 33 | 2.96239 | .51569 |
| | | Post BMI | 27.24 | 33 | 2.88696 | .50256 |
| Usual program | Pair 1 | PreSBP | 129.41 | 32 | 5.297 | .936 |
| | | Post SBP | 131.06 | 32 | 8.148 | 1.440 |
| | Pair 2 | PreDBP | 82.06 | 32 | 4.996 | .883 |
| | | Post DBP | 82.69 | 32 | 5.981 | 1.057 |
| | Pair 3 | PreBMI | 28.31 | 32 | 2.31178 | .40867 |
| | | Post BMI | 28.46 | 32 | 2.35486 | .41628 |

**Paired Samples Test**

| Group | | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference Lower | Upper | | | |
| Self-management program | Pair 1 | PreSBP - Post SBP | 8.758 | 6.245 | 1.087 | 6.543 | 10.972 | 8.056 | 32 | .000 |
| | Pair 2 | PreDBP - Post DBP | 4.182 | 4.592 | .799 | 2.553 | 5.810 | 5.231 | 32 | .000 |
| | Pair 3 | PreBMI - Post BMI | 1.02303 | .53340 | .09285 | .83389 | 1.21217 | 11.018 | 32 | .000 |
| Usual program | Pair 1 | PreSBP - Post SBP | -1.656 | 7.852 | 1.388 | -4.487 | 1.175 | -1.193 | 31 | .242 |
| | Pair 2 | PreDBP - Post DBP | -.625 | 6.298 | 1.113 | -2.896 | 1.646 | -.561 | 31 | .579 |
| | Pair 3 | PreBMI - Post BMI | -.15344 | .50004 | .08840 | -.33372 | .02685 | -1.736 | 31 | .093 |

Independent t-test between experimental and control group

at pretest and posttest

**Group Statistics**

| | Group | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| PreSBP | Self-management program | 33 | 131.21 | 5.65 | .98 |
| | Usual program | 32 | 129.41 | 5.30 | .94 |
| PreDBP | Self-management program | 33 | 82.39 | 5.77 | 1.00 |
| | Usual program | 32 | 82.06 | 5.00 | .88 |
| PreBMI | Self-management program | 33 | 28.26 | 2.96 | .52 |
| | Usual program | 32 | 28.31 | 2.31 | .41 |
| Post SBP | Self-management program | 33 | 122.45 | 7.40 | 1.29 |
| | Usual program | 32 | 131.06 | 8.15 | 1.44 |
| Post DBP | Self-management program | 33 | 78.21 | 5.93 | 1.03 |
| | Usual program | 32 | 82.69 | 5.98 | 1.06 |
| Post BMI | Self-management program | 33 | 27.24 | 2.89 | .50 |
| | Usual program | 32 | 28.46 | 2.35 | .42 |

**Independent Samples Test**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| PreSBP | Equal variances assumed | .824 | .367 | 1.328 | 63 | .189 | 1.806 | 1.359 | -.911 | 4.522 |
| | Equal variances not assumed | | | 1.330 | 62.930 | .188 | 1.806 | 1.358 | -.908 | 4.520 |
| PreDBP | Equal variances assumed | .714 | .401 | .247 | 63 | .806 | .331 | 1.341 | -2.348 | 3.011 |
| | Equal variances not assumed | | | .248 | 62.216 | .805 | .331 | 1.338 | -2.342 | 3.005 |
| PreBMI | Equal variances assumed | .045 | .832 | -.074 | 63 | .941 | -.04902 | .66049 | -1.36890 | 1.27085 |
| | Equal variances not assumed | | | -.075 | 60.275 | .941 | -.04902 | .65798 | -1.36506 | 1.26701 |
| Post SBP | Equal variances assumed | .500 | .482 | -4.461 | 63 | .000 | -8.608 | 1.929 | -12.464 | -4.752 |
| | Equal variances not assumed | | | -4.455 | 61.999 | .000 | -8.608 | 1.932 | -12.471 | -4.745 |
| Post DBP | Equal variances assumed | 1.134 | .291 | -3.029 | 63 | .004 | -4.475 | 1.478 | -7.428 | -1.523 |
| | Equal variances not assumed | | | -3.029 | 62.901 | .004 | -4.475 | 1.478 | -7.428 | -1.522 |
| Post BMI | Equal variances assumed | .090 | .765 | -1.872 | 63 | .066 | -1.22549 | .65463 | -2.53366 | .08268 |
| | Equal variances not assumed | | | -1.878 | 61.225 | .065 | -1.22549 | .65258 | -2.53030 | .07932 |


# APPENDIX O

## List of the experts

List of experts

1. Sr. Col. Asst. Prof. Ram RungsinRam Rungsin, M.D.
   Department of Military and Community Medicine,
   Pramongkutkloa College of Medicine
2. Somnuk Sakulhongsophon, Ph.D. (Nursing), APN, RN
   Ramathibodi School of Nursing, Mahidol University
3. Asst. Prof. Wasana Ruaisungnoen, Ph.D. (Nursing), RN
   Faculty of Nursing, Khon Kaen University
4. Assoc. Prof. Dr.Daroonwan Suksom, D.S. (Physiology)
   Faculty of Allied Health Sciences, Chulalongkorn University
5. Asst. Prof. Rewadee Chongsuwat, Ph.D. (Food Nutrition and Dietetics)
   Faculty of Public Health, Mahidol University

# VITA

Thida Tongvichean was born in 1981 at Bangkok Metropolitan. She received a Bachelor of Nursing Science from Faculty of Medicine Ramathibodi Hospital, Mahidol University, Bangkok, Thailand in 2002. She got a Master of Science (Public Health) from Faculty of Public Health, Mahidol University, Thailand in 2007. She had 6 years of clinical experience in surgical ward at Ramathibodi hospital and she was promoted to be an instructor in the community health nursing at Ramathidobi School of Nursing since 2008. In 2011, She had received the scholarship from Faculty of Medicine Ramathibodi Hospital to study a doctoral program in nursing science at Faculty of Nursing Chulalongkorn University from 2011 until present.