

Effect of Self-Management Exercise Program on Physical Fitness among People with Prehypertension and Obesity: A Quasi Experiment Study

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Abstract: Lack of exercise related to poor self-management can lead to a low level of physical fitness in people with prehypertension and obesity. Self-management has the potential to enhance exercise performance with moving people from the beginning of behavior change to action and maintenance behavior. This study investigated the effect of the Self-Management Exercise Program on physical fitness in persons with prehypertension and obesity developed by primary investigator. A total of 32 participants were randomly assigned to two groups: the experimental group (n=16) receiving the Self-Management Exercise Program and the control group (n=16) receiving conventional care. Physical fitness was evaluated by the 3-minute step test, 60 second chair stand, and sit and reach test at baseline and 12-week. Data analyzed using descriptive statistics, Chi-square test, Independent *t*-test, and Paired *t*-test.

The results demonstrated that the experimental group had significantly higher physical fitness compared to before the program; and significantly higher than those compared to the control group. The Self-Management Exercise Program is effective and improves physical fitness in people with prehypertension and obesity including cardiorespiratory fitness, muscular endurance, and flexibility. Nurses can apply the program to enhance physical fitness in this population by increasing exercise behavior through self-management skills. Further study is needed to confirm whether the physical fitness increases over an extended time using the program.

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Introduction

Physical fitness is important for people with prehypertension and obesity in staying healthy. In prehypertension, systolic blood pressure (SBP) ranges from 120–139 millimeters of mercury (mmHg), or the diastolic blood pressure (DBP) ranges from 80–89 mmHg. The indication of obesity is that the body mass index (BMI) is ≥ 25 (kilogram/meter²,

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kg/m²).^{1,2} Improvement of physical fitness is associated with blood circulation improvement, a lower risk of hypertension (HT), increase muscle strength, and building strong bones.³ Moreover,

physical fitness improves mental strength such as enhancing one's memory.⁴

Previous studies showed that a low level of 73.4% in physical fitness, and over 90% of those with prehypertension and obesity have a lack of exercise according to the American College of Sports Medicine (ACSM).^{4,5} The Thai National Statistical Office reported that, in 2015, less than a quarter (23.40%) of Thai people performed exercise and duration of exercise averaged 35.23 minutes per day.⁶ Lack of exercise related to poor physical fitness is often caused by barriers to exercise at the individual level and include lack of time, preferring to do other things, and lack of enjoyment, motivation, confidence, and money.⁷

Exercise has benefits to help those with prehypertension and obesity by delaying and preventing of the related diseases.⁵ They have to learn about their own assessment, monitoring behavior, establishing goal, plan and performance skills, and balancing positive and negative attitudes in order to control and manage their behavior.⁸ Self-management has the potential to enhance exercise adherence with moving people from the beginning of change to action and maintenance.^{9,10,11} It is not only behavior change, but also a crucial strategy that can effectively help people to improve physical fitness.¹²

The concept of the self-management suggests that people's responsibility to accept treatment needs a strong motivation to change.¹³ This concept relates to a person's behavior to compare between the obtained information and target behavior, and the reaction to their own behavior. It is more effective cognitive and interpersonal actions to change behavior. Consequently, the behavior change is to improve health status or health outcomes.

A descriptive study found a positive relationship between self-management score and exercise behavior in persons with prehypertension.¹¹ Also, self-management has increased risk awareness and improved self-management behavior among study participants.^{14,15} In addition self-management program improve health

outcome and enhance physical fitness related to better quality of life among persons who live with chronic illness.¹⁶ Furthermore, self-management in lifestyle modification program has been found to be helpful in adopting healthy lifestyle habits and improving physical fitness in overweight or obese adults. However, more than 30% of participants did not complete exercise sessions.¹⁷

Previous studies of self-management with prehypertension were likely to focus on behavior change and the previous program did not specify in the obese population. Moreover, outcome evaluation measuring program effects on physical fitness in this group was still questionable.¹¹ Thus, the purpose of this study was to test the effectiveness of the Self-Management Exercise Program (SMEP) on physical fitness among persons with prehypertension and obesity.

Literature review

Physical fitness is a set of attributes or characteristics individuals had or achieved that relate to ability to perform daily activities.¹⁸ Components of physical fitness that relate to health include cardiorespiratory fitness, muscular endurance, and flexibility. Cardiorespiratory fitness is the ability of the body involving heart, lungs vessels, and large-muscles to perform exercise for prolonged period.^{3,18} Muscular endurance is the ability of muscles to repeatedly contract or continuous contractions over a longer period of time.¹⁸ Flexibility is the ability of joints and muscles to move a full range of motion.^{3,18} The importance of physical fitness is the relationship with health since low physical fitness leads to adverse health outcomes such as cardiovascular disease while higher level of physical fitness is associated with lower risks for poorer health.¹⁹

Poorer physical fitness is found more than half of people with prehypertension and obesity,^{3,20,21} and these are important risks for developing hypertension.^{21,22} Prehypertension is strongly associated

with obesity in adults.^{23,24} People with prehypertension and obesity have a three times higher risk of hypertension progression than those with prehypertension and normal weight.^{25,26} Physical fitness is associated with physical activity especially exercise. However, a large number of people with prehypertension and obesity lack of exercise.^{3,20,21}

Various studies applying the self-management concept were effective in improving health behaviors and health outcomes.^{11,14-17} Self-management, emphasizing changes in behaviors can prevent further illness,^{13,27} and self-management models consist of self-monitoring, self-evaluation, and self-reinforcement.¹³ Brisk walking exercise is recommended as a clinical guideline to prevent hypertension in high risk groups.¹⁸

Brisk walking is an aerobic exercise that involves large-muscles and is effective to improve health outcome including cardiorespiratory fitness.^{19,28} For promoting health and physical fitness, the recommendation is moderate intensity of exercise with the target heart rate zone of 64%-75% of maximum heart rate ($\%HR_{max}$) which is calculated by subtracting the person's age from 220. The goal of brisk walking is estimated at 100 steps per minutes providing approximate moderate intensity of exercise for 30-60 minutes per day about 5-7 days per week.¹⁸

Moreover, resistance training and stretching exercise is also recommended for people with prehypertension and obesity.¹⁸ Resistance training is a type of exercise that promotes muscle strength such as chest press, abdominal crunch, leg press, resistance bands, and weight lifting. Resistance training should be done 2 to 3 days per week with 8-12 repetitions, 1-2 sets which is effective in improving muscle endurance.¹⁸ Stretching exercise helps to promote flexibility by improving the range of motion in muscle, joint, and tendon such as hamstring, shoulder, back, and stretches. This exercise is recommended 2-3 days per week daily being most effective holding a static stretch for 10-30 seconds with 2 to 4 repetitions for most adults.^{3,18}

Therefore, in this study, the Self-Management Exercise Program (SMEP) was developed by applying self-management model in exercise program. The program comprises brisk walking, weight lifting, and stretching exercise to improve physical fitness in people with prehypertension and obesity. It was hypothesized that the participants in the experimental group would have lower mean of heart rate, higher mean of number of completed stand for muscular endurance, and higher mean of distance between starting and reached point for flexibility at 12th week compared to the control group and compared before receiving the SMEP.

Methods

Design: This intervention study used a quasi-experimental with a two-group pretest and posttest design.

Sample and Setting:

The sample size was calculated using the G*Power Program. A significance level of .05, a power level of .8, and effect size of 1.02 were set. This effect size was obtained from a previous study of self-management exercise intervention on cardiorespiratory fitness in persons with non-communicable disease.²⁹ The result of program suggested a sample size of each group was 13 and total sample size was 26. Concerning 20% of attrition rate of a similar study, a total of 32 participants, 16 in each group, were enough. The participants were recruited in the study based on the inclusion criteria: 1) age 35-59 years; 2) SBP of 120-139 or DBP of 80-89 mmHg; 3) not taking antihypertensive drugs; and 4) BMI \geq 25 kg/m². The exclusion criteria were the participants unable to attend five sessions of the program for the experimental group.

One district of one province in central of Thailand was purposively selected due to it having a middle-age population with overweight or obesity about 45.09% and it was consistent with increasing of hypertension, which was the first leading cause of morbidity in this province.^{30,31} Then, two of four

sub-districts were randomly selected by the drawing lot technique. Potential participants were obtained from databased of two primary care units which were in selected sub-districts. The potential participants who lived in the first sub-district were randomly selected by drawing lot technique and were assigned in the control group while those who lived in another sub-district were randomly selected by the same technique and were assigned in the experimental group. The participants were selected until reaching the total number which was 16 participants in each group.

Ethical Considerations

The study was approved by the Research Ethics Review Committee, Chulalongkorn University, Thailand (No.042/2559). Potential participants were informed about the research objectives and all procedures of the SEMP and the study and their rights were protected with regard to data confidentiality, and right to refuse participation and withdraw from the study at any time. The participants could ask any questions and receive the answers from the primary investigator (PI) before making a decision to participate in the study. Data collection was performed after the participants gave written consent form. The PI kept the completed questionnaire in a locked cabinet and computer was protected by using password. Only the PI had access to the data.

Research instruments:

A **demographic data form** was developed to obtain information such as age, gender, education level, marital status, occupation, and exercise behaviors.

An **exercise diary** was the instrument to collect data on participants' daily exercise, and was developed by PI. The participants recorded the frequency, intensity, time, and type of exercises and the diary was used to monitoring exercise behavior of the participant through self-management skills.

Physical fitness was composed of three indicators; cardiorespiratory fitness, muscular endurance, and flexibility. A **physical fitness form** to obtain the data was developed by PI. One research assistant was trained to record all the data in this form. The assessment was performed following guideline of ACSM and

Department of Physical education.^{3,32}

Cardiorespiratory fitness involved supplying oxygen of body to muscles for exercise, measured by performing three-minute step test designed to evaluate response of heart rate in one minute during cardiovascular activity. The three-minute step test needed each participant to perform the test by stepping up and down from a 12-inch step. At the end of three minutes, each person stopped and then heart rate was measured and recorded. A lower heart rate represented higher cardiorespiratory fitness level.³²

Muscular endurance involved repetition of muscle against resistance. It was measured by performing the 60-second chair stand test designed to evaluate the total number of a full standing position and sit back down in chair with arms to be crossed over chest for 60 seconds. Higher scores represented higher fitness level in muscular endurance.³²

Flexibility involved movement of muscles and joints. It was evaluated by sit and reach test designed to measure the distance between starting and reached point in the centimeters when the participant sat on the floor with legs stretched out and knees straight by against the testing box, placed hand over hand, and slowly slide hand forward on the scale of box as far as possible. Participants had to perform two times and the highest score was recorded in the centimeters (cm). Higher scores represented higher fitness level in flexibility.³²

The Self-management Exercise Program

This program was developed by PI based on the concept of self-management¹³ and exercise guidelines of American College of Sports Medicine for improving physical fitness in persons with prehypertension and obesity.¹⁸ It was composed of five sessions over a 12-week program period leading by the PI and consisted of various strategies such as group discussion, home visits, and telephone visits. The content was validated by five experts. Major comments and suggestions included 1) to avoid spending time too much in two first sessions, 2) to revise difficult part for education session, and 3) to control the intensity of exercise by simple way such as talk test

and heart rate measurement. After receiving comments and suggestions, the program was revised as follows:

The first session began with 30 minutes of problem assessment and motivation to change and increase exercise behavior by encouraging the participants to express their own health problem and share experience about health behaviors in the past including helping them to set goal of behavioral change.

The second session was a small group education and training focused on the provision of information about exercise self-management for 90 minutes. Activities comprised providing target exercise behavior, practicing exercise in brisk walking, weight lifting, and stretching exercise, and practicing to write effective goals, self-monitoring, self-evaluation, self-reinforcement, and action plan. Additionally, the participants learned how to record exercise behavior and were given an exercise booklet and exercise diary.

The third session began after completing education and training session for a week. This session was a 60-minute small group discussion. The activities composed sharing and discussion on exercise experience including practice, strength, problems, and barriers of performance, and exercise record.

The fourth session was telephone visit used to monitor exercise behavior of the participants for about 15–30 minutes at 2nd, 3rd, 6th, and 10th week. This session focused on exercise behavior at home including consultations, helping the participants to reduce exercise barriers, and encouraging them perform exercise continuously.

The fifth session was home visit which was strategy to monitor exercise behavior of the participants about 15–30 minutes at 4th and 8th week. This session focused on exercise behavior record in exercise diary, goal setting, and support to perform following the protocol program.

Exercise program in the SMEP included stretching exercise for 5–10 minutes before exercise. Then, brisk walking was performed at a speedy pace faster than normal rate and an individual would have a slightly difficult breathing but still able to converse and performed with the speed at least 100 steps per

minute, for 30–60 minutes, at least 5 days per week. Lastly, weight lifting was performed by lifting dumbbell for twice a week with 8–12 repetitions for each muscle group at least one set. Talk test and heart rate were used in determining the intensity of the exercise. Talk test was valid, reliable, and practical for monitoring exercise intensity.³³ Each day, intensity of exercise was determined by talk test and heart rate. Moderate intensity was set in this program to improve physical fitness. People performed moderate intensity of exercise which meant people could talk but could not sing a song during exercise and heart rate in range of 64%–75% of the maximum heart rate. This point was suited to the exercise intensity that was equivalent to moderate intensity of exercise by ACSM.¹⁸ The participants would be trained while performing the talk test and monitoring their heart rate for determining the intensity of exercise. Thereafter, they recorded it in exercise diary. The participants who performed exercise following program at least 80% of the time were included in the experimental group.

Conventional care

The participants in control group received the conventional care: advice for lifestyle modification including nutrition, exercise, and emotional management after being assessed health status. This was delivered by the nurse or health care provider. The participants were measured outcomes variables at first week as baseline and at 12th week as the end of the study.

Data Collection

After the participants were provided with explanation regarding goals and procedure of the study, the participants were asked to sign the consent form. Thereafter, the participants were asked to complete the demographic data form and physical fitness of the participant was assessed including cardiorespiratory fitness, muscular endurance, and flexibility. The physical fitness was measured at baseline and at 12th week after completing the program by research assistance.

Data Analysis

Descriptive statistics were used, including means, standard frequency, percentage, and deviation to describe the demographic characteristics and physical

fitness of participants. Chi-square and independent t-test were used to determine differences in demographic characteristics, exercise behavior, and physical fitness between the experimental and control groups. Paired t-test was performed for differences in physical fitness within between groups before and after the program. Statistical significance was set at $p < .05$.

Before analysis, assumption of the independent t-test and paired t-test including normality distribution and homogeneity of variance were tested. Normality distribution of cardiorespiratory fitness, muscular endurance, and flexibility were tested with the One-Sample Kolmogorov-Smirnov test. The results showed non-significance ($p > .05$). Homogeneity of variance was tested by Levene's test. The results showed no significant differences ($p > .05$) among dependent variables except cardiorespiratory fitness at 12-week. Therefore, the interpretation of results from this variable

needed to be careful by using t-test for unequal variance.

Results

The participants in the experimental and control groups had a mean age of 52.06 years (SD = 4.43) and 53.13 (SD = 6.02), respectively. Most were female, living with spouse, and had completed primary education. About two-thirds (68.75%) of the experimental group was occupied as agriculturists while half (50%) of the control group was laborer. However, there was no significant difference of characteristics of the participants between the experimental and control group at baseline (Table 1). Also, there was no significant difference in physical fitness including cardiorespiratory fitness, muscular endurance, and flexibility between both groups at baseline (Table 2).

Table 1 Characteristics of the participants (n = 32)

Characteristics	Experimental group	Control group	Statistic value	p-value
	(n=16)	(n=16)		
	Number (%)	Number (%)		
Age (year)			.57 ^a	.57
40-44	1 (6.25)	3 (18.75)		
45-49	3 (18.75)	1 (6.25)		
50-54	7 (43.75)	2 (12.50)		
55-59	5 (31.25)	10 (62.50)		
Mean ± SD	52.06 ± 4.43	53.13 ± 6.02		
Gender			.52 ^b	.47
Male	5 (31.25)	8 (50.00)		
Female	11 (68.75)	8 (50.00)		
Living with spouse			-	1.00
Yes	14 (87.50)	14 (87.50)		
No	2 (12.50)	2 (12.50)		
Educational level			.15 ^c	.70
Primary	12 (75.00)	10 (62.50)		
Secondary and higher	4 (25.00)	6 (37.50)		
Occupation			5.29 ^c	.07
Agriculturist	11 (68.75)	7 (43.75)		
Laborer	2 (12.50)	8 (50.00)		
Other	3 (18.75)	1 (6.25)		

a, t-test; b, Chi-square test (Continuity correction); c, Fisher's Exact test; SD, standard deviation

Table 2 Differences in physical fitness (cardiorespiratory fitness, muscular endurance, and flexibility) between the experimental group and control group at baseline (n = 32)

Variable	Experimental group (n = 16)		Control group (n = 16)		t	p-value
	M	SD	M	SD		
Cardiorespiratory fitness						
Heart rate (beat/minute)	130.63	5.03	128.81	4.92	1.03	.311
Muscular endurance						
Number of completed stand (time/minute)	27.56	7.16	24.44	6.54	1.29	.207
Flexibility						
Distance between starting and reached point (cm)	13.77	6.36	10.33	7.91	1.36	.185

Results in this study supported the hypotheses. Firstly, physical fitness in the experimental group between after receiving the SMEP indicated the experimental group participants had a statistically lower heart rate ($p < .01$), higher number of completed stand ($p < .01$), and higher distance between starting and reached point ($p < .01$) than before receiving the SMEP, which reflected higher physical fitness after receiving the SMEP (**Table 2 and 3**).

Table 3 Comparison of the differences in physical fitness (cardiorespiratory fitness, muscular endurance, and flexibility) between the experimental group and the control group at the 12th week (n = 32)

Variable	Experimental group (n = 16)		Control group (n = 16)		t	p-value
	M	SD	M	SD		
Cardiorespiratory fitness						
Heart rate (beat/minute)	123.25	4.34	129.44	7.07	-2.98	.006
Muscular endurance						
Number of completed stand (time/minute)	34.19	6.71	25.44	6.89	3.64	.001
Flexibility						
Distance between starting and reached point (cm)	16.01	5.66	8.19	8.36	3.10	.004

Secondly, when comparing between two groups, there were statistically significant differences in physical fitness [cardiorespiratory fitness ($p < .01$), muscular endurance ($p < .01$), and flexibility ($p < .01$)] at the 12th week (**Table 3**). Also, comparisons of mean differences in physical fitness between both groups indicated that the experimental group had statistically higher mean differences in cardiorespiratory fitness ($p < .01$), muscular endurance ($p < .05$), and flexibility ($P < .01$) compared to those in the control group (**Table 4**).

Table 4 Comparison of mean difference (d*) in physical fitness before and after program between the experimental and control groups

Variables	Experimental group (n=16)		Control group (n=16)		Mean Difference	t	p-value
	d*	SD	d*	SD			
Cardiorespiratory fitness							
Heart rate (beats/minute)	-7.38	6.27	.63	5.61	-8.00	-3.80	.001
Muscular endurance							
Number of completed stand (times/minute)	6.63	5.93	1.00	6.62	5.63	2.53	.017
Flexibility							
Distance between starting and reached point (cm)	2.24	3.22	-2.13	4.41	4.37	3.20	.003

d* = Mean difference between before and after

In additional, at 12-weeks the mean scores of exercise behavior in the control and experimental groups were 16.94 (SD = 15.62) and 76.94 (SD = 3.87) respectively, indicating that the experimental group had higher exercise behavior than the control group. Mean difference of exercise behavior between the two groups was significantly different ($t = 14.92$, $p < .01$).

The effectiveness of the program on physical fitness was calculated using Cohen's d . The effect size was determined by mean difference between two groups and divided by the standard deviation of control group.³⁴ At 12-week, the effect sizes of the SMEP on physical fitness including cardiorespiratory fitness, muscular endurance, and flexibility were large ($d = 0.85, 1.27, \text{ and } 0.94$, respectively). The results of the study support the benefits of SMEP on three domains of physical fitness in persons with prehypertension and obesity.

Discussion

The results revealed that the SMEP effectively improved physical fitness in participants with prehypertension and obesity. Physical fitness was improved by performing exercise. To ensure that the participants were compliant with exercise, self-management was applied in exercise program. The improvement could be explained that the program motivated their promotion for exercise behavior change leading them to improve their physical fitness.

There were possible reasons of improvement in physical fitness of the participants who attended in the SMEP. First, problem assessment was the first step to identify causes of health problems and barriers of exercise. Second, substantial knowledge and goal setting was provided to clearly specified target exercise behavior. Increasing knowledge of physical fitness and a positive attitude in exercise were consistent with previous studies that the knowledge related to compliance with therapy.³⁵ Third, the

exercise program including brisk walking, weight lifting, and stretching was the effective way to improve cardiorespiratory fitness, muscle endurance, and flexibility. These exercises could be easily performed at home and were less expensive. The findings were supported by the guideline of exercise for increasing physical fitness.¹⁸ Fourth, an exercise diary, which was a self-motoring tool, was used to monitor their exercise behavior. The participants in the experimental group were more likely to engage in an exercise program than those in the control group. Self-monitoring was an effective tool for behavior change with increasing awareness and monitoring progress.¹³ Fifth, this program conducted group discussion to help the participants in the experimental group to increase knowledge and confidence in exercise performance, and provided social support. Moreover, monitoring by telephone and home visit enabled the participants to clarify their problems or received the advice that they needed.

The findings of this study are consistent with prior studies using self-management that indicated the effectiveness of self-management to improve physical fitness.^{12,36} Previous studies also revealed that the self-management effect on knowledge and health behaviors in persons with chronic illness, both hypertension and metabolic syndrome.^{37,38} This study supported a meta-analysis showing effectiveness of increasing exercise or physical activity to improve physical fitness and the behavioral program was the most effective program,³⁹ and compared favorably with a meta-analysis of the self-management program on health status and outcomes in people who had chronic diseases.⁴⁰

Limitation

The participants with prehypertension and obesity lived at only two selected sub-districts in one central province of Thailand. Thus, generalization is limited to persons with prehypertension and obesity

in other cultures and different settings. This study focused on self-management exercise program to improve physical fitness. Other factors that may affect to physical fitness may need to be examined. The 12-week intervention might have been too short and might have affected the findings; therefore, an extended duration of the intervention might improve further physical fitness. Also, future studies should evaluate health outcomes such as hypertension risk awareness, quality of life, BP, body weight, BMI, body composition, lipid profile, and glucose.

Conclusions and Implication for Nursing Practice

Results supported that the SMEP was an effective strategy for enhancing exercise behavior and improving physical fitness in people with prehypertension and obesity during 12 weeks. Therefore, the SMEP can be applied in health care setting for the regular care in this group to decrease risk of chronic disease. Community health nurses could be trained to provide the program for the participants in their catchment area and nurses should encourage participants' families to motivate the participants performing exercise following the program. To maintain exercise need, an exercise diary is an important instrument to motivate the participants engaging in and continuing exercise. Nurses can implement the SMEP for persons with prehypertension and obesity to evaluate the effectiveness of this program in long-term for physical fitness enhancement, and reduce risk of hypertension. Moreover, nurses can enlist cooperation from multidisciplinary teams to ensure behavioral change in this population.

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ผลของโปรแกรมการจัดการตนเองด้านการออกกำลังกายต่อสมรรถภาพทางกายของผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน

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บทคัดย่อ: การขาดการออกกำลังกายสัมพันธ์กับการจัดการตนเองที่ไม่เพียงพอซึ่งนำไปสู่การมีระดับสมรรถภาพทางกายต่ำในผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน การจัดการตนเองมีความสำคัญในการเพิ่มการออกกำลังกายด้วยการเริ่มต้นจากการเปลี่ยนแปลงพฤติกรรมจนสามารถปฏิบัติได้อย่างยั่งยืน การศึกษานี้เป็นการศึกษาผลของโปรแกรมการจัดการตนเองด้านการออกกำลังกายต่อสมรรถภาพทางกายของผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วน กลุ่มตัวอย่างทั้งหมด จำนวน 32 ราย สุ่มเข้ากลุ่มทดลอง จำนวน 16 ราย ได้รับโปรแกรมการจัดการตนเองด้านการออกกำลังกาย และกลุ่มควบคุม จำนวน 16 ราย ได้รับการดูแลตามปกติ กลุ่มตัวอย่างทั้งหมดได้รับการประเมินสมรรถภาพทางกายด้วยวิธีการก้าวเป็นจังหวะ 3 นาที การยืนน่องบนเก้าอี้ 60 วินาที และการนั่งงอตัวไปข้างหน้าก่อนและหลังเข้าโปรแกรม 12 สัปดาห์ วิเคราะห์ข้อมูลด้วยสถิติบรรยาย การทดสอบไคสแควร์ การทดสอบที่อิสระ และการทดสอบทีคู่

ผลการศึกษา พบว่า กลุ่มทดลองมีสมรรถภาพทางกายสูงกว่าก่อนเข้าโปรแกรม และกลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติ โปรแกรมการจัดการตนเองด้านการออกกำลังกายสามารถเพิ่มระดับสมรรถภาพทางกายในผู้ที่มีภาวะก่อนความดันโลหิตสูงและอ้วนได้อย่างมีประสิทธิภาพทั้งทางด้านความอดทนของระบบไหลเวียนเลือด ความอดทนของกล้ามเนื้อ และความอ่อนตัว พยาบาลสามารถประยุกต์โปรแกรมนี้เพื่อเพิ่มระดับสมรรถภาพทางกายในประชาชนกลุ่มดังกล่าวได้ โดยการเพิ่มพฤติกรรมการออกกำลังกายผ่านทักษะการจัดการตนเอง การศึกษาครั้งต่อไปควรประเมินผลของโปรแกรมต่อสมรรถภาพทางกายในระยะเวลาที่ยาวนานมากขึ้น

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คำสำคัญ: การออกกำลังกาย ภาวะอ้วน สมรรถภาพทางกาย ภาวะก่อนความดันโลหิตสูง การจัดการตนเอง

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