EFFECTS OF SELF-REGULATION PROGRAM ON EATING BEHAVIOR, EXERCISE BEHAVIOR, BODY MASS INDEX, AND BLOOD PRESSURE AMONG HYPERTENSIVE PATIENTS IN CITY DISTRICT, LOPBURI PROVINCE, THAILAND[1]

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ABSTRACT

This quasi-experimental study aimed to examine the effect of self-regulation program on eating behavior, exercise behavior, body mass index (BMI), and levels of blood pressure among hypertensive patients. The study sample was hypertensive patients who were uncontrolled blood pressure and overweight. These patients live in City District, Lopburi province. Simple random sampling was used for selecting the study sample following the inclusion criteria. Two groups of the sample included 30 hypertensive patients in an experimental group and 30 hypertensive patients in a control group. Patients in the experimental group receiving the program of self-regulation that researchers developed by using Bandura's framework. Patients in the control group received traditional care. Instruments for collecting data included the questionnaire of demographic, eating behaviors, exercise behaviors, and the clinical information assessment form, including the record of blood pressure and BMI. Study data were analyzed by using mean, standard deviation, percentage, and frequency. The difference between eating behavior, exercise behavior, BMI, and blood pressure were tested by the paired t-test and dependent procedure. The result revealed that after the patients in the experimental group receiving the program, the average score of eating behavior, and exercise behavior have statistically significantly higher before receiving the program ($P \leq .050$). Additionally, levels of systolic blood pressure after participating in the program was statistically significantly lower than before participating in the program. On the other hand, the level of BMI and diastolic blood pressure of the patients in an experimental group has not statistically significantly different between before and after receiving the program ($P \geq .05$). For the difference between groups, average scores of eating behavior and exercise behavior of the patients in an experimental group were statistically significantly higher than scores of patients in a control group after receiving the program ($p \leq .050$). Also, levels of blood pressure and BMI of the patient in an experimental group after participating in the program was statistically significantly lower than the patient in the control group ($p \leq .050$).

Keywords: Hypertension, self-regulation program, eating behavior, exercise behavior, body mass index.

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Background of the study

Hypertension is a chronic disease that is a public health problem in many countries of the world. In 2008, worldwide, an estimated 40 % of adults who are 25 years old and above had been diagnosed with hypertension. It is estimated that over 1.5 billion people will have hypertension in 2025. Likewise, hypertension is also a significant cause of morbidity and mortality in the world population. Each year, about 8 million people die from hypertension. In 2015, Thailand had a prevalence of hypertension of 25.32 per 100,000 populations, and the mortality rate 12.1 per 100,000 populations (IFPMA, 2016; Report Public Health Statistics, 2016). Both morbidity and mortality rate due to hypertension problem is more likely to increase. Regarding hypertension, it contributes to health effects. Make people face risk factors for coronary heart disease and stroke. It is responsible for at least 45 % of deaths due to heart disease, and at least 51% of deaths due to stroke (IFPMA, 2016). It also affects the economic burden of health care costs, including the costs of absenteeism, loss of productivity, disability, premature death, and cost of the caregiver (Department of Medical Service, 2014).

The most effectiveness method to control levels of blood pressure in the hypertensive patient is lifestyle modification. A variety of lifestyle modification has been shown in clinical trials to lower blood pressure. These include weight loss in the overweight, physical activity, reduction of dietary sodium intake, a diet with increased fresh fruits and vegetables and reduced saturated fat content, stop smoking, and stop drinking alcohol. These are important and also compliant with necessary treatment for hypertensive patients (Report office NCD, 2016;). Earlier studies found that the program to modify health behaviors in hypertensive patients was associated with a significant reduction in blood pressure.(Plaiyod, Panpakdee &Taikerd, 2012; Klaysakun, 2008; Kongjarern, Wattana, & Teeranut, 2013; Sharifi, Jeihooni, & Vahdat, 2016; Shin, Kim, & Choi, 2016). A program to change health behaviors among hypertensive patients is applied from several models. In this study, the researcher uses the concept of Bandura, which the significant self-regulative mechanism operates through three principal subfunctions. These include self-monitoring of one's behavior, its determinants, and its effects; judgment of one's behavior about personal standards and environmental circumstances; and affective self-reaction. Self-regulation also encompasses the self-efficacy mechanism, which plays a central role in the exercise of personal agency by its substantial impact on thought, affect, motivation, and action. The same self-regulative system is involved in moral conduct although compared to the achievement domain, in the moral domain the evaluative standards are more stable, the judgmental factors more varied and complex, and the effective self-reactions more intense. (Bandura,1991)

Due to the problem of hypertension that is harmful to Thai people health, researchers develop the program based on the concept of Bandura for applying to overweight hypertensive patients who are not able to control blood pressure. After the hypertensive patient receives the program, patients should be able to control the blood pressure level to the target of less than 140/90 m.m.Hg and to delay complications. The study result is used to enhance patient health status and quality of life. Also, health care providers can use the self-regulating program to care for uncontrolled hypertensive patients.

Research Objectives

The purpose of this research is as follows:

1.To compare the average eating behavior and exercise behavior scores, mean body mass index (BMI) and mean blood pressure levels of hypertensive patients in the experimental group before and after receiving the program.

2 . To compare the average eating behavior and exercise behavior scores, mean body mass index and mean blood pressure level of hypertensive patients between the experimental group and the control group after receiving the program.

Research hypothesis

1 . After receiving the program, the experimental group has an average score on eating behavior, and exercise behavior higher than before receiving the program.

2 . After receiving the program, the experimental group has mean body mass index and mean blood pressure level lower than before receiving the program

3 . After receiving the program, the experimental group has an average score on eating behavior, and exercise behavior higher than the control group.

4 . After receiving the program, the experimental group has mean body mass index and mean blood pressure level lower than the control group.

Research Framework

This study used the Bandura's conceptual framework, that includes as follows: 1) self-monitoring means the ability to both observe and evaluate one's behavior. 2) self-judgment means the regular comparison of individual performance with the existing standards and goals, and 3) effective self-reaction means creating meaningful changes to achieve a goal.

Research Methodology

This research is a quasi-experimental design. It is two group pre-posttest design that is used to compare the effects of the self-regulation program on eating behavior, exercise behavior, BMI, and blood pressure among hypertensive patients in the city district, Lopburi province, Thailand.

Population and sample

The population of this study was 1,235 patients with hypertension. These patients who were diagnosed with primary hypertension lived in City district, Lopburi province. The study period is in December 2016 to February 2017. The sample size was calculate using G*power program. The power analysis was .80, alpha was .05, and effect size was .31. After calculating, the sample size was 30 hypertensive patients in the experimental group, and the control group includes 30 samples. Sixty hypertensive patients were recruited by purposive sampling according to the inclusion criteria as follows: 1)diagnosed with hypertension for at least 1 year, 2) blood pressure can be controlled at 140/90 mmHg, and not more than 160/100 mm.Hg., 3) BMI is higher than or equal to 23 kg /m^2, 4) hypertensive patients with no underlying diseases and without complications, 5) having continuous high blood pressure medication and come to the appointment, 6) having normal stress and no depression, 7) having the ability to do daily activities and there is no limitation on exercise, 8) having ability in reading Thai, writing Thai and no problem in communication, and9) willing to participate in the research project. The exclusion criteria were as follows: 1) the patient had complications during the study, 2) they did not

voluntarily participate in the program, and 3) they were unable to participate throughout the program.

Research instruments

1. The device for collecting data was:1) demographic questionnaire, including age, sex, education and others, 2) questionnaire of eating and exercise behaviors that was developed by the researcher, including 20 questions using a measure of Likert scale. Five levels were never (0 times per week), rarely (1-2 days per week), sometimes (3-4 days per week), often (5-6 days per week), and always (daily), and 3) blood pressure monitor and scales assessment form.

2. The self-regulation program was developed by the researcher with three components that included 1) self-monitoring, 2) self-judgment, and 3) affective self-response. The program was implemented to the experimental group for eight weeks to complete as follows:

Week 1: Health education for self-controlled behavior such as knowledge of hypertension disease, complications, and practice for blood pressure control by using media, and a good model controlled blood pressure person in the community, and manual guideline. Eating behavior education for eating control by using food model and manual guideline, exercising behavior, and demonstration by using elastic exercise and arm swing exercise, focus group by using observation and self-assessment technique to set the archiving goal of reducing blood pressure and BMI in record note.

Week 2: Participants make self-observation of their health and week 3: monitoring, and supporting technique by using home visit and phone talking to reflect their practice with control blood pressure. In addition, the researcher and team supervise sample who are uncontrolled blood pressure and their practice.

Week 4: Brainstorming technique to share their perception and practice by using apparition and helping group for unchangeable health behavior.

Week 5-7: Monitoring and supporting technique by using home visit with phone calling to reflect the self-control of the eating and exercise behaviors to reach the goal and help the patient to achieve the goal.

Week 8: Focus group for sharing about health behaviors and self-evaluation and supporting participation by health volunteers and professional nurses in the health-promoting hospital

Quality of study instruments

Questionnaires that were used in the study were proved for validity by three chronic disease care experts. For the reliability of questionnaire, Cronbach's alpha coefficient was 0.76 that is acceptable levels.

Protection of human subjects

This research was reviewed by the Ethics Research Board of Boromarajonani College of Nursing Phraputthabat. The sample will be provided with the objective, benefit, and risk of the research and they can withdraw from the research without any reason. The data of the sample was kept confidential.

Data collection

The researcher explains the purpose and procedure of the research to the sample. The data were collected from 30 experimental and 30 control groups using a specific randomized controlled trial. Select the experimental group first. The match between the experimental group

and the control group was similar. The researcher arranged the sample to clarify and inform the objectives of the research, protected and signed in a consent form to participate in the research.

For the experimental group, before and after receiving the program, the researcher collected data using demographic questionnaire, eating behavior questionnaire and behavioral exercise questionnaire, BMI, and levels of blood pressure. Data of an experimental group was collected in the first week of the program and the 8th week.

The researcher collected data from the control group by using demographic questionnaire, eating behavior questionnaire and behavioral exercise questionnaire, BMI, and the blood pressure was measured in the first week, after that the control group received regular care from the District Health Promotion Hospital. The researcher collected the data in the 8th week.

Data analysis

Study data were analyzed as follows:

1. Demographic data were analyzed using percentage, mean and standard deviation.

2. To compare the average eating behavior score, exercise behavior, mean BMI, and mean blood pressure levels after receiving the program in the experimental group by using the dependent t-test procedure.

3. To compare the average eating behavior score, exercise behavior, mean BMI, and mean blood pressure levels after receiving the program between the experimental group and the control group by using the independent t-test procedure.

Results

1. For characteristics of the sample (table 1), the majority of sample were female (experimental group 76.70%, n=23, control group 76.70%, n=23) , age 61-70 years old (experimental group 36.70%, n=11, control group 40.00%, n=12), married (experimental group 73.30%, n=22, control group 70.00%, n=21), elementary school (experimental group 86.70%, n=26,control group 93.33%, n=28), unemployed (experimental group 50.00%, n=15, control group 40.00%, n=12), income less than 5,000 baht/month (experimental group 70.00%, n=21,control group 56.67%, n=17), duration of hypertension less than 5 years (experimental group 50.00%, n=15,control group 53.33%, n=16), and non smoking (experimental group 96.70%, n=29, control group 93.33%, n=28).

2. With regard to the difference of the average eating behavior score (Table 2), exercise behavior, mean BMI, and mean blood pressure level in the experimental group before and after receiving the program, the results showed that average eating behavior score and average exercise behavior score were statistically significantly higher than before receiving the program ($p \leq 0.05$). The mean systolic blood pressure was statistically significantly lower than before receiving the program ($p \leq 0.05$). On the other hand, the mean of BMI and mean diastolic blood pressure of the patients in an experimental group were not statistically significant after receiving the program.($p > 0.05$).

3. For the difference between groups (table 3), average scores of eating behavior and exercise behavior of the patients in an experimental group were statistically significantly higher than scores of patients in a control group after receiving the program ($p \leq 0.05$). Additionally,

mean blood pressure levels and mean BMI of the patient in an experimental group after receiving the program was statistically significantly lower than the patient in the control group ($p \leq 0.05$).

Table 1 Demographic data of hypertensive patients (n=60)

	Experimental group (n = 30)		Control group (n = 30)	
	N	%	N	%
Sex				
Male	7	23.30	7	23.30
Female	23	76.70	23	76.70
Age				
41-50 years	2	6.70	4	13.33
51-60 years	10	33.30	10	33.34
61-70 years	11	36.70	12	40.00
> 70 years	7	23.30	4	13.33
Marital status				
Single	2	6.70	2	6.67
Married	22	73.30	21	70.00
Divorced/Window/Separated	6	20.00	7	23.33
Education				
Elementary	26	86.70	28	93.33
Lower Secondary	1	3.30	2	6.67
High School	2	6.70	0	0
University	1	3.30	0	0
Occupation				
Employee	5	16.70	8	26.67
Personal Business	3	10.00	7	23.33
agriculture	7	23.30	3	10.00
Unemployed	15	50.00	12	40.00
Income (Baht / month)				
< 5,000	21	70.00	17	56.67
5,001-10,000	8	26.70	9	30.00
10,001-15,000	0	0	1	3.33
> 15,000	1	3.30	3	10.00
Duration of hypertension(year)				
< 5	15	50.00	16	53.33
6-10	11	36.70	9	30.00
11-15	1	3.30	2	6.67
16-20	2	6.70	1	3.33
> 20	1	3.30	2	6.67
Smoking				
Non-smoking	29	96.70	28	93.33
Smoking	1	3.30	2	6.67

Table 2 The difference of eating behavior, exercise behavior, BMI, and blood pressure in experimental group before and after receiving the self-regulation program (n=30)

	Before receiving the program		After receiving the program		*t*	the
	$\overline{X}$	*SD*	$\overline{X}$	*SD*		
Eating behavior	50.93	4.62	54.13	4.61	-4.98	0.001
Exercise behavior	9.10	1.63	10.27	1.78	-4.96	0.001
Body mass index	28.19	3.40	28.04	3.63	1.18	0.247
SBP (mmHg)	143.03	9.62	130.13	12.77	6.07	0.000
DBP (mmHg)	77.27	10.62	75.27	8.04	1.01	0.320

Table 3 The difference of eating behavior, exercise behavior, BMI, and blood pressure between experimental group and control group after receiving the self-regulation program (n=60)

	experimental group (n = 30)		control group (n = 30)		*t*	the
	$\overline{X}$	SD	$\overline{X}$	SD		
Eating behavior	54.13	4.61	47.83	2.88	6.35	0.001
Exercise behavior	10.27	1.78	8.17	1.23	5.39	0.001
Body mass index	28.04	3.63	26.12	3.39	2.13	0.038
SBP (mmHg)	130.13	12.77	142.20	6.41	-4.63	0.001
DBP (mmHg)	75.27	8.04	85.63	6.17	-5.60	0.001

Discussions

According to the study result, after implementation of the self-regulation program, hypertensive patients have better eating and exercising behavior scores, and they can reduce more systolic blood pressure than before implementing the program with statistic significantly. However, BMI and diastolic blood pressure are no statistically significant differences. The results demonstrate the effectiveness of the program that promotes the health status of the patient. The implementation program was the process of self-action continuously in 8 weeks. The researcher and teams inform the knowledge of disease and complication, health practice especially eating and exercising behavior to the patient. In addition, the self- regulation program makes the patient know about the self-observation with eating and exercising. Moreover, they practice about how to calculate BMI and blood pressure with standard criteria to make the patient to be aware and lead them to make a decision, and set the goal. Furthermore, patients reflect their perception about health behaviors with the goal to make them having high confident and cheerful behavior to practice continuously.

Eating behavior found that after implementation, the patient in an experimental group has a higher score of eating behavior than before receiving the program with statistic significantly ($p \leq 0.05$). The researcher and teams educated health information by using lecture and gave an example via media and food model, picture and content manual guideline to return reflection and consulting monitor, encouragement both home visit and phone talking. Also, sample participates in a small group for sharing knowledge and experience of eating behavior which makes participant has a good eating behavior of self-regulation. The study result is similar to the study of Pengleng, Therawiwat, Imamee &Tansakul.(2013) that found after implementation; participants have a higher score of eating behavior than before implementation. Furthermore, the study of Thasatan, Homsin, Srisuriyawet.& Klajon.(2015) and Shine (2017) found that the implementation group had a higher score of behavior (eating, exercise) than before implementation.

Exercising behavior revealed that the after implementation, patients in the experimental group had a higher score of exercising behavior score than before implementation and control group with statistics significantly at p-value ≤ 0.05. This program provided knowledge about exercising behavior by lecture and demonstration of exercising using both elastic exercising and arm swing that provide set of choice for exercise, distribution of material and exercising manual guideline. These can help the patient to return practice, monitoring consultation, encouragement by home visit and phone call. Furthermore, participants join the small group discussion for exchanged experience between the experimental group to make them have self-regulation of exercising behavior and better exercise behavior. This study is consistent with the study of Thasatan et al.(2015) and Shine (2017) that the experimental group had a higher score of behavior (eating, exercise) than before implementation.

For the body mass index, after implementation, the experimental group had lower body weight than before the experiment. However, the weight loss was not statistically different ($P > .05$). Their body mass index had lower than the control group with statistic significantly at p-value ≤ 0.05. This research revealed that participants in experimental group could monitor salt food but they did not control fried food and the period between dinner and sleep are less than 4 hours because a family member needs to have dinner together. Moreover, most of the exercises are a light exercise which helps strengthen bone and muscle. However, this program had a short period only eight weeks which are not enough time to reduce body weight. This study is similar to the study of Wassa & Senaruk (2015) and Plaiyod, et al. (2012) that implementation group did not differ in body weight after and before implementation.

Blood pressure found that after implementation, the experimental group had systolic blood pressure differ from before execution with statistic significantly at p-value ≤ 0.05. However, diastolic blood pressure did not change before and after implementation ($P > .05$). The findings were similar to the study of Chaiyarit & Jangsombatsiri (2015) that found the participants who did arm swing exercise had more decreased systolic blood pressure than diastolic blood pressure after implementation. There are many factors that affect the reduction of blood pressure. The results of this research program can modify the eating behaviors and exercise behaviors, but this program cannot make the experimental group achieved a weight loss goal. However, compared with the control group, the experimental group had significantly lower blood pressure than the control group after implementation.

Recommendation

The self-regulation program can be applied to care the patients who are uncontrolled blood pressure and body mass index, especially eating and exercising behavior to control themselves levels of blood pressure. In addition, health care providers should encourage patients to participate in self-regulation health behavior. Long-term studies should be conducted for the further outcome.

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