

## The Effect of Public Health Center-Based Hypertension School on Hypertension-related Knowledge, Self-efficacy, Anthropometric Value and Blood Pressure

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### Abstract

*This study is to identify the effects of hypertension management program at a community health center on the disease-related knowledge, self-efficacy, anthropometric measurements and blood pressure of a hypertensive patient in local community. This study is a quasi-experimental study using nonequivalence control group no-synchronized design in order to verify the effects of the hypertension management program at a community health center on the hypertension-related knowledge, self-efficacy, anthropometric measurements and blood pressure of a hypertensive patient in local community. The result indicated a significant difference between the experimental group and control group in the scores of hypertension-related knowledge ( $t=-4.25$ ,  $p<.001$ ), self-efficacy ( $t=-4.20$ ,  $p<.001$ ), systolic blood pressure ( $t=7.70$ ,  $p<.001$ ) and diastolic blood ( $t=5.91$ ,  $p<.001$ ), body weight ( $t=2.32$ ,  $p=.026$ ) and abdominal circumference ( $t=2.17$ ,  $p=.036$ ). The hypertensive patients' knowledge and self-efficacy were improved, and their weight and abdominal circumference as well as systolic blood pressure and diastolic blood pressure were reduced. Therefore, it was confirmed that multilateral approaches in terms of physical and psychosocial aspects only targeting hypertensive patients were required for managing hypertensive patients in local community.*

**Keywords:** Hypertension School, Hypertension related Knowledge, Self-efficacy, Blood Pressure.

### 1. Introduction

Hypertension is a representative disease that causes cardiocerebrovascular diseases that are ranked in 2nd and 3rd from the 10 leading causes of death in Korea and this chronic disease has the highest prevalence rate[1]. According to the statistics regarding the causes of death in 2017[2], 10 leading causes of death include malignant neoplasm (cancer), heart disease, cerebrovascular disease and pneumonia, and it is reported that hypertensive diseases are ranked in the 9th compared to the previous year.

In this way, hypertension is a chronic disease which is one of the 10 leading causes of death and currently more than one-third of adults have hypertension, diabetes or hyperlipidemia. It is expected that the prevalence

of such chronic diseases will increase due to rapid aging and a change to western lifestyle[3].

The causes of hypertension are known to be an increase in the resistance of blood vessel walls and an increase in blood volume, and their epileptogenesis is related to heredity, age and many environmental factors[4]. And, excessive intake of sodium as well as obesity, alcohol intake, lack of exercise, smoking, dyslipidemia and diabetes are known to be the main causes[5]. Chronic diseases such as hypertension require continuous management due to the process of their occurrence over a long period of time and because it is difficult to completely cure such diseases and there is also a risk of complications. A very important factor for active hypertension management methods is the improvement of personal lifestyle such as increase in physical activities, improvement of physical strength, control of body weight, control of salt intake and control of drinking and smoking[6]. In case of a person who has hypertension, only minor symptoms such as headache, ringing and dizziness are shown without specific observable symptoms until a complication is developed. However, if hypertension persists, the organs of the body will be damaged or complications will be developed[7]. Complications include heart disease symptoms such as heart failure, angina and myocardial infarction, kidney disease symptoms such as renal failure and uremia, and cerebral nerve symptoms such as cerebral hemorrhage and stroke will be developed, and 80% of stroke is caused by hypertension, thus hypertension treatment is very important for preventing a stroke[8]. In this way, hypertension is known to be a major risk factor for cardio cerebrovascular diseases, but the recognition rate and the control rate of hypertension (based on patients) are 67.3% and 46.2%, respectively[9], indicating that special attention to the management and treatment of hypertension is highly required.

The hypertension treatment methods include the drug therapy and the correction of lifestyle which is a non-drug therapy, and the correction of lifestyle includes healthy eating habits, exercise, smoking cessation and moderation in drink[10]. The correction of lifestyle should also be carried out for a hypertensive patient who receives the drug therapy, and this can reduce the dose and quantity of hypertension medicine, maximize the medicinal effect and reduce a risk of cardiocerebrovascular diseases at the same time, so it is very important to the treatment of hypertension[7].

Recently, the central government and local governments have been implementing a demonstration project to register and manage patients with chronic diseases as a customized door-to-door health management project since 2007 in order to manage chronic diseases such as hypertension and diabetes, reduce risk of complications, guarantee healthy living of people and reduce their social and economic burden[11]. Various government projects are being operated based on community health centers in order to manage patients with hypertension and prevent complications, and the hypertension management program is also operated as one of these projects. The central government and local governments are seeking for various methods to provide hypertension-related knowledge to hypertensive patients and improve their self-efficacy through the hypertension management program, and encouragement and support are continuously given to encourage hypertensive patients to participate in the program and improve self-management function by themselves. However, it is expected that the prevalence rate of hypertension will increase at a fast pace along with rapid aging of population in Korea regardless of such efforts[12]. Therefore, the importance of the management of such chronic diseases is being more emphasized.

Obesity due to an increase in body weight leads to an increase in cardiac output, and peripheral vascular resistance, worsening the hypertension[13], and the incidence of hypertension increases by 2.4 times in case of obesity[14], so it is shown that the weight control is more effective for lowering blood pressure than only applying drug therapy for the treatment of hypertension[15]. The dietary education and the exercise program targeting hypertensive patients and diabetic patients have been operated at the same time at a community health center, so in-depth and intensive management has not been given to each of these patients sufficiently. It is

essential to organize and operate program targeting only hypertensive patients residing in local community for an independent and systematic management in order to provide the newest knowledge and information as well as improve their self-efficacy, allowing them to improve self-management ability and manage their diseases well by themselves.

Precedent studies to verify the effects of intervention program for hypertension at community health centers including Evaluation of Oral Health Promotion Program Connected with Hypertension and Diabetes Management Programs in Gangreung[16], Effects of Exercise Program of Public Health Center on Diabetes and Hypertension[17] reduced salt-diet and nutrition education[18] and The Effect of Case Management program for Hypertensive patient[19] have been carried out mainly. However, there is almost no program targeting only hypertensive patients operated in a community health center and there is almost no study for identifying the effects of hypertension management program only for hypertensive patients on their hypertension-related knowledge, self-efficacy, anthropometric measurements and blood pressure as well as almost no evidentiary materials for evaluating such effects.

Therefore, this study was carried out in order to verify the effects of hypertension management program targeting only hypertensive patients at a community health center on their disease-related knowledge, self-efficacy, anthropometric measurements including body weight and abdominal circumference and blood pressure and help establishing more efficient nursing plans to allow hypertensive patients using a community health center to understand their chronic disease and carry out self-management more systematically and continuously.

### **1.1 Purpose**

This study is to identify the effects of hypertension management program at a community health center on the disease-related knowledge, self-efficacy, anthropometric measurements and blood pressure of a hypertensive patient in local community, and the specific purpose of this study is as follows.

- Identify the effects of hypertension management program at a community health center on the disease-related knowledge of a hypertensive patient.
- Identify the effects of hypertension management program at a community health center on the self-efficacy of a hypertensive patient.
- Identify the effects of hypertension management program at a community health center on the anthropometric measurements (body weight and abdominal circumference) of a hypertensive patient.
- Identify the effects of hypertension management program at a community health center on the blood pressure of a hypertensive patient.

### **1.2 Research Hypothesis**

- Hypothesis 1. The experimental group that participated in the hypertension management program at a community health center will show higher hypertension-related knowledge score than the control group that did not participate in the hypertension management program.
- Hypothesis 2. The experimental group that participated in the hypertension management program at a community health center will show higher self-efficacy than the control group that did not participate in the hypertension management program.
- Hypothesis 3. The experimental group that participated in the hypertension management program at a community health center will show lower anthropometric measurements (body weight and abdominal circumference) than the control group that did not participate in the hypertension management program.
- Hypothesis 4. The experimental group that participated in the hypertension management program at a

community health center will show lower pressure levels than the control group that did not participate in the hypertension management program.

## **2. Methods**

### **2.1 Research Design**

This study is a quasi-experimental study using nonequivalence control group no-synchronized design in order to verify the effects of the hypertension management program at a community health center on the hypertension-related knowledge, self-efficacy, anthropometric measurements and blood pressure of a hypertensive patient in local community.

### **2.2 Research Subjects**

An explanation on the purpose of this study was given to the head, medical doctor, charging section chief and official in charge of health promotion management project of the community health center in G city and their consents were obtained first. The research subjects are patients diagnosed with hypertension, registered and managed in the doctor's office of community health center in G city and take hypertension medicine, the specific selection criteria are as follows.

- . A person who has been diagnosed with hypertension, has been visiting the doctor's office of community health center in G city and receiving management for more than 2 years
- . A person who has never participated in the hypertension education program at community health centers
- . A person who has normal cognitive function and can understand the contents of each question
- . A person recommended by the medical doctor in the community health center among patients diagnosed with hypertension and receiving continuous management from the community health center in G city
- . A person who understands the purpose of this study and agreed to participate in the study

The number of research subjects in this study was 40 patients and it was calculated by setting .8 for effect size[8], .05 for significance level and .05 for statistical power for difference between two independent means in the G\*Power 3.1.5 program. However, a total of 50 patients including 25 patients for the experimental group and 25 patients for the control group were selected by considering the elimination rate. 4 patients in the experimental group were eliminated due to low attendance and 3 patients in the control group were eliminated due to insufficient responses to the questionnaire and the suspension of participation, so the number of final research subjects was 43 patients including 21 patients in the experimental group and 22 patients in the control group, and the elimination rate was 14.0%.

### **2.3 Hypertension Management Program at a Community Health Center**

The hypertension management program is a part of chronic disease management project that is carried out targeting hypertensive patients in the community by the community health center in G city and this program is for the disease management and the prevention of complications by improving the disease-related knowledge, self-efficacy and continuous nursing practice ability. The hypertension management program was operated for twice a week, 2 hours a day for 8 weeks by 1 sports curer who worked at the health promotion room in the community health center, 1 assistant instructor and 2 professors in the department of nursing science. The hypertension management program was operated 2 hours a day, 2 times a week for a total of 8 weeks based on the fact that it was effective from the precedent study carried out by [18] that the nutrition education program targeting hypertensive patients at a community health center was carried out 2 hours a day, once a week for a total of 8 weeks and the precedent study carried out by [20] that east-west rehabilitation and self-help

management program was applied to post-stroke patients for 2 hours a day, twice a week. The program was composed of 3 stages including the preparation stage, main stage and final stage in this study.

### 2.3.1 Preparation Stage

In the preparation stage, exchanging greetings to each other, clapping hands, calling names, sharing a story regarding the contents they carried out during the participation in the program and what they have done at home on the day when no program was provided, evaluating their commitment they fulfilled at home and the contents of such commitment and reinforcing to continue such commitments were carried out repeatedly as a method to improve the sociality, concentration and mutual friendliness of hypertensive patients. It took approximately 30 to 40 minutes.

### 2.3.2 Main Stage

In this stage, various subjects regarding hypertension were selected every week and the program was operated at the main hall of community health center in G city twice a week for 8 weeks, a total of 16 times. 2 professors in the department of nursing science of Y University delivered lecture regarding the definition, type and risk factors of hypertension, and 2 sports curers and 1 assistant instructor from the health promotion room in the community health center taught the exercise method, Blood Pressure Down and Self-Confidence Up Exercise, that helped hypertensive patients to relieve and manage their stress. And, the less intensive exercise program starting from whole body stretching was composed and operated to prevent strain on joints. For nutrition-related education, the dietitian from the community health center delivered a lecture while introducing the diet therapy and diet related to hypertension directly, and a smile therapist in the hypertensive patients' stress management I and a music instructor in the hypertensive patients' stress management II were invited to relieve hypertensive patients' stress. (Table 1)

**Table 1. Contents of Hypertension School**

Week	Contents	Self-efficacy promotion strategies
1	<ul style="list-style-type: none"> <li>* Introduction of health school program and self-introduction</li> <li>· A common understanding in blood pressure</li> <li>· Blood pressure down, confidence up gymnastic</li> <li>-The daily stress management</li> <li>- Whole body stretching, muscle and joint movement of arms and legs stretching for strengthening joint circular movement</li> </ul>	<ul style="list-style-type: none"> <li>▪Strengthen a positive decision</li> <li>▪Improving confidence</li> <li>▪support, encouragement, compliment</li> <li>▪Text to perform tasks</li> </ul>
2	<ul style="list-style-type: none"> <li>* The definition of high blood pressure and type</li> <li>· Blood pressure and the definition of high blood pressure, The type of high blood pressure</li> <li>· Blood pressure down, confidence up gymnastic</li> <li>· The daily stress management</li> <li>· Whole body stretching, muscle and joint</li> </ul>	<ul style="list-style-type: none"> <li>▪Strengthen a positive decision</li> <li>▪Improving confidence</li> <li>▪support, encouragement, compliment</li> <li>▪Presentation of performance contents</li> <li>▪Text to perform tasks</li> </ul>

	<p>movement of arms and legs stretching for strengthening joint circular movement</p>	
3	<p>* A risk factor for high blood pressure</p> <ul style="list-style-type: none"> <li>· High blood pressure cases factors(Impossible change factors, Change factor as possible)</li> <li>- ·The daily word of caution(Prevent complications in daily life)</li> <li>- ·Blood pressure down, confidence up gymnastic</li> <li>. ·The daily stress management</li> <li>. ·Whole body stretching, muscle and joint movement of arms and legs stretching for strengthening joint circular movement</li> </ul>	<ul style="list-style-type: none"> <li>▪Strengthen a positive decision</li> <li>▪Improving confidence</li> <li>▪support, encouragement, compliment</li> <li>▪Presentation of performance contents</li> <li>▪Text to perform tasks</li> </ul>
4	<p>* A good sport for high blood pressure treatment 1</p> <ul style="list-style-type: none"> <li>- Daily tool in the home or motor sports education possible advantage of the family environment 1</li> <li>- Blood pressure down, confidence up gymnastic</li> <li>. The daily stress management</li> <li>. Whole body stretching, muscle and joint movement of arms and legs stretching for strengthening joint circular movement</li> </ul>	<ul style="list-style-type: none"> <li>▪Strengthen a positive decision</li> <li>▪Improving confidence</li> <li>▪support, encouragement, compliment</li> <li>▪Presentation of performance contents</li> <li>▪Text to perform tasks</li> </ul>
5	<p>* A good sport for high blood pressure treatment 2</p> <ul style="list-style-type: none"> <li>- ·Daily tool in the family and domestic environments using a sports can be with education 2</li> <li>- ·Blood pressure down, confidence up gymnastic</li> <li>. ·The daily stress management</li> <li>. ·Whole body stretching, muscle and joint movement of arms and legs stretching for strengthening joint circular movement</li> </ul>	<ul style="list-style-type: none"> <li>▪Strengthen a positive decision</li> <li>▪Improving confidence</li> <li>▪support, encouragement, compliment</li> <li>▪Presentation of performance contents</li> <li>▪Text to perform tasks</li> </ul>
6	<p>* How high blood pressure management to good nutrition</p> <ul style="list-style-type: none"> <li>·Nourishing food can do at home, high blood pressure</li> <li>·Blood pressure down, confidence up gymnastic</li> </ul>	<ul style="list-style-type: none"> <li>▪Strengthen a positive decision</li> <li>▪Improving confidence</li> <li>▪support, encouragement, compliment</li> <li>▪Presentation of performance contents</li> <li>▪Text to perform tasks</li> </ul>

	<ul style="list-style-type: none"> <li>- The daily stress management</li> <li>- Whole body stretching, muscle and joint movement of arms and legs stretching for strengthening joint circular movement</li> </ul>	
7	<ul style="list-style-type: none"> <li>* How stress management of hypertension patients 1</li> <li>·Laughter therapy(Let's to relieve their stress)</li> <li>·Blood pressure down, confidence up gymnastic</li> <li>-The daily stress management</li> <li>-Whole body stretching, muscle and joint movement of arms and legs stretching for strengthening joint circular movement</li> </ul>	<ul style="list-style-type: none"> <li>▪Strengthen a positive decision</li> <li>▪Conditioning of stress</li> <li>▪Improving confidence</li> <li>▪support, encouragement, compliment</li> <li>▪Presentation of performance contents</li> <li>▪Text to perform tasks</li> </ul>
8	<ul style="list-style-type: none"> <li>* How stress management of hypertension patients 2</li> <li>· Music therapy(Having fun world)</li> <li>· Blood pressure down, confidence up gymnastic</li> <li>-The daily stress management</li> <li>-Whole body stretching, muscle and joint movement of arms and legs stretching for strengthening joint circular movement</li> </ul>	<ul style="list-style-type: none"> <li>▪Strengthen a positive decision</li> <li>▪Conditioning of stress</li> <li>▪Improving confidence</li> <li>▪support, encouragement, compliment</li> <li>▪Presentation of performance contents</li> <li>▪Felt the program</li> </ul>

### 2.3.3 Self-efficacy and Self-esteem Improvement Strategy

In this study, verbal persuasion was utilized in order to improve the self-efficacy of hypertensive patients who were chronically ill and whose self-efficacy and self-esteem were declined significantly. The importance of having self-confidence in the control of high blood pressure and the prevention of complications was emphasized in each exercise and education session, and patients made a prior commitment to carry out exercise and diet therapy that they could perform at their home on the day when no program was provided. They verbally expressed the contents of their commitment and whether they fulfilled their commitment at home or not on the day when they participated in the program. Encouragement and compliment were given to a patient who actively participated in the program, and they shared their experience to each other by presenting their successful self care cases. Patients were guided to write self-nursing diary each time they carried out self-nursing activity, and compliment was given for an act which was practiced well and encouragement was given for an act which was not practiced well in order to allow them to discuss any difficulties or problems with each other and carry out such actions better. After the hypertension management program at the community health center was completed, a completion certificate was given to patients to allow them to have a sense of accomplishment and encouragement was also given to them in order to motivate them to manage hypertension and prevent complications continuously. It took approximately 60 minutes.

### 2.3.4 Final Stage

In the final stage, muscular and joint circulation exercise from "Blood Pressure Down and Self-Confidence Up Exercise" were carried out, and the target patients were informed of the exercises, contents of self-nursing

related to the improvement of basic lifestyle such as diet therapy and stress management method that patients needed to carry out at home until the next program. It took approximately 20 to 30 minutes.

## 2.4 Research Tool

### 2.4.1 Hypertension-related Knowledge

Hypertension-related knowledge measurement questions that were used in the precedent studies of [21] and Chang[22] were revised and then supplemented by [23] were used in this study for the hypertension-related knowledge. 20 questions for measuring the hypertension-related knowledge were composed of 5 fields including general knowledge of hypertension, treatment and medicine, dietary control, exercise and stress. 1 point for each correct answer and 0 point for each incorrect answer are given as the hypertension-related knowledge score so that the total score from 0 point as the minimum score to 20 points as the maximum score is available, and a higher score means greater knowledge. The credibility at the time that the tool was developed was Cronbach's  $\alpha=.72$ , and it was KR (Kuder-Richardson)-20=.795 in this study.

### 2.4.2 Self-efficacy

In this study, the tool for measuring the level of confidence in the execution of health behavior related to the management of hypertension developed by Park[24] was used for the self-efficacy measurement tool. This tool consists of 10 questions in 4-point Likert scale from 10 points as the minimum score to 40 points as the maximum score, and a higher score means greater confidence in the execution of health behavior. The credibility at the time that the tool was developed was Cronbach's  $\alpha=.72$ , and it was Cronbach's  $\alpha=.762$  in this study.

### 2.4.3 Anthropometric Measurements and Measurement of Blood Pressure

In this study, weight and abdominal circumference were measured for the anthropometric measurements. Weight was measured automatically for once using HM-201 (Phoenix, Korea) in the condition of everyday wear with no shoes, and the abdominal circumference of target patients was measured up to one decimal place from the middle part between the bottom of the lowest rib and iliac crest in pelvis in an upright posture in centimeters using a measuring tape in order to measure the degree of abdominal obesity from target patients. The target patients were guided to take a rest for 5 minutes before the hypertension management program began and then the mercury sphygmomanometer (Baumanmeter, NY, USA) was used to measure the blood pressure. The blood pressure was measured for twice when the upper arm of target patients was at the height of their heart, and then the average blood pressure was calculated, and if a difference between the measured blood pressures was more than 5 mmHg, the blood pressure was measured once again and the average blood pressure was calculated. The target patients were guided not to intake caffeine, do exercise or smoke a cigarette at least 30 minutes prior to the measurement.

## 2.5 Data Collection

Data collection was carried out after the approval from the head of the community health center, official in charge of health promotion and official in charge of relevant task was received on a visit to the community health center in G city, Gyeongsangnam-do Province. In order to reduce a possibility of spreading treatment between the control group and the experimental group, patients who received hypertension management from the doctor's office of community health center from March 6, 2017 to April 28, 2017 were assigned to the control group and patients who agreed to participate in the hypertension management program from May 8, 2017 to June 30, 2015 were assigned to the experimental group using nonequivalence control group no-synchronized design. And, education regarding the purpose of study, matters that required attention at the



time of collecting data and communication technique with target patients was given to 1 task personnel from the community health center and 3 research assistants and data was collected using the structured questionnaire. A researcher and 3 research assistants explained the purpose of this study to the target patients, received their written consent, distributed the questionnaire and instructed them to fill out the questionnaire. The questionnaire was either filled out by each target patient or in case any target patient was unable to fill out the questionnaire, the researcher or the research assistants read, explained each question to the target patient and filled out and collected the questionnaire directly. The general characteristics, hypertension-related knowledge, self-efficacy, anthropometric measurements and blood pressure were measured from the experimental group and the control group as a pretest, and the hypertension management program was carried out for the experimental group for 8 weeks. After the hypertension management program for 8 weeks was completed, hypertension-related knowledge, self-efficacy, anthropometric measurements and blood pressure of target patients in the experimental group and the control group were measured again as a post test.

## 2.6 Ethical Consideration

In this study, the hypertension management program at the community health center was introduced and an explanation for the purpose of study, course of program, pretest and post test methods and confidentiality were given to target patients prior to the beginning of hypertension management program, and the program was carried out after a written consent from the target patients who agreed to participate in the study was received. The target patients were informed that they could stop participating in the program at any time if they wanted during pretest, posttest and program and there was no disadvantage due to the participation in this study. In case of the control group, encouragement was given to the target patients to carry out self-management efficiently through individual counseling after the program, and they were allowed to participate in the 2nd hypertension management program at the community health center in future in consideration of ethical aspects if they wanted.

## 2.7 Data Analysis

In this study, the hypertension management program at the community health center was introduced and an explanation for the purpose of study, course of program, pretest and posttest methods and confidentiality were given to target patients prior to the beginning of hypertension management program, and the program was carried out after a written consent from the target patients who agreed to participate in the study was received. The target patients were informed that they could stop participating in the program at any time if they wanted during pretest, posttest and program and there was no disadvantage due to the participation in this study. In case of the control group, encouragement was given to the target patients to carry out self-management efficiently through individual counseling after the program, and they were allowed to participate in the 2nd hypertension management program at the community health center in future in consideration of ethical aspects if they wanted.

## 3. Results

### 3.1 Homogeneity Test for General Characteristics of Participants

As a result of testing the homogeneity between 21 target patients in the experimental group and 22 target patients in the control group, there was no significant difference between two groups statistically, so it showed that two groups were homogeneous. (Table 2)

**Table 2. General Characteristics of Subjects**

Characteristics	Categories	Total(n=43)	Exp.	Cont.	$\chi^2$ or t	p
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		(n=21)		(n=22).		
		n (%)	n (%)	n (%)		
Age(year)	60 ≥	4( 9.3)	2( 9.6)	2( 9.1)	6.69	.167
	60 ~ 64	8(18.6)	3(14.3)	5(22.7)		
	65 ~ 69	14(32.6)	8(38.1)	6(27.3)		
	70 ~ 74	13(30.2)	4(19.0)	9(40.9)		
	75 ~ 79	4( 9.3)	4(19.0)	0( 0.0)		
Gender	Male	9(20.9)	3(14.3)	6(27.3)	1.10	.457
	Female	34(79.1)	18(85.7)	16(72.7)		
Marital State†	None	1( 2.3)	0( 0.0)	1( 4.5)	4.60	.162
	Married	23(53.5)	14(66.7)	9(40.9)		
	Bereaved	17(39.5)	7(33.3)	10(45.5)		
	Divorce	2( 4.7)	0( 0.0)	2( 9.1)		
Religion†	Christianity	5(11.6)	1( 4.8)	4(18.2)	3.63	.498
	Buddhist	22(51.2)	12(57.1)	10(45.5)		
	Catholic	3( 7.0)	2( 9.5)	1( 4.5)		
	None	12(27.9)	5(23.8)	7(31.8)		
	Etc.	1( 2.3)	1( 4.8)	0( 0.0)		
Education Level	None	10(23.3)	3(14.3)	7(31.8)	3.11	.590
	Elementaty School	11(25.6)	5(23.8)	6(27.3)		
	Middle School	12(27.9)	7(33.3)	5(22.7)		
	High School	9(20.9)	5(23.8)	4(18.2)		
	College	1( 2.3)	1( 4.8)	0( 0.0)		
Job†	None	37(86.0)	19(90.4)	18(81.9)	1.34	1.000
	Farmer	3( 7.0)	1( 4.8)	2( 9.1)		
	Commerce	1( 2.3)	0( 0.0)	1( 4.5)		
	Etc.	2( 4.7)	1( 4.8)	1( 4.5)		
Economic Level	High	1( 2.3)	1( 4.8)	0( 0.0)	2.54	.282
	Middle	19(44.2)	11(52.3)	8(36.4)		
	Lo	23(53.5)	9(42.9)	14(63.6)		
Diagnosis of Hypertension(year)	1 ≥	8(18.6)	2( 9.5)	6(27.3)	3.23	.388
	1 ~ 4	9(20.9)	4(19.0)	5(22.7)		
	5 ~ 9	14(32.6)	9(42.9)	5(22.7)		
	10 ≤	12(27.9)	6(28.6)	6(27.3)		
Family History of Hypertension	Yes	26(60.5)	15(71.4)	11(50.0)	2.06	.215
	No	17(39.5)	6(28.6)	11(50.0)		
Health Education Experience	Yes	11(25.6)	5(23.8)	6(27.3)	0.07	1.000
	No	32(74.4)	16(76.2)	16(72.7)		
Management Difficulty†	No Time	21( 4.6)	1( 4.8)	1( 4.5)	4.16	.426
	As having no idea	16(37.2)	6(28.6)	10(45.5)		
	Irritatingly	10(23.3)	4(19.0)	6(27.3)		
	Knackering	6(14.0)	3(14.3)	3(13.6)		

Etc. 9(20.9) 7(33.3) 2( 9.1)

Exp.=Experimental group; Cont.=control group, †Fisher's exact test.

### 3.2 Homogeneity Test between the Experimental Group and the Control Group for Dependent Variables

The homogeneity testing result between two groups for hypertension-related knowledge, self-efficacy, anthropometric measurements and blood pressure that are dependent variables prior to the participation in the hypertension management program at the community health center is as shown in the following table (Table 3). There was no significant difference between two groups statistically for each dependent variable, so it confirmed that the experimental group and the control group were a homogenous group.

**Table 3. Comparison of Outcome Variable between Experimental and Control Group**

Variables	Exp. (n=21)	Cont. (n=22)	t	p	
	M±SD	M±SD			
Hypertension related Knowledge	12.86±2.24	11.77±2.83	1.389	.172	
Self-Efficacy	29.57±3.61	27.55±4.55	1.611	.115	
Blood Pressure	Systolic	136.33±9.35	138.18±10.53	-0.608	.547
	Diastolic	84.29±9.78	88.18±6.65	-1.534	.133
Body Weight	62.19±8.39	64.64±12.67	-0.742	.462	
Abdominal Circumference	89.24±8.76	85.41±8.48	1.456	.153	

Exp.=Experimental group; Cont.=control group

### 3.3 Hypothesis Testing for the Effects of Participation in the Hypertension Management Program

The hypothesis test results are shown in Table 4. As a result of testing Hypothesis 1. "The experimental group that participated in the hypertension management program at a community health center will show higher hypertension-related knowledge score than the control group that did not participate in the hypertension management program," the experimental group showed an increase in hypertension-related knowledge from 12.86±2.24 points in the pretest to 18.10±1.38 points in the post test, showing a significant increase statistically in comparison to the control group's hypertension-related knowledge that was 11.77± 2.83 points in the pretest and 11.64±2.50 points in the posttest (t=-4.25, <.001). Therefore, Hypothesis 1 was supported.

As a result of testing Hypothesis 2. "The experimental group that participated in the hypertension management program at a community health center will show higher self-efficacy than the control group that did not participate in the hypertension management program," the experimental group showed an increase in self-efficacy from 29.57±3.61 in the pretest to 34.48±2.86 in the post test, showing a significant increase statistically in comparison to the control group's self-efficacy that was 27.55± 4.55 in the pretest and 28.86±2.92 in the post test. Therefore, Hypothesis 2 was supported (t=-4.20, <.001).

As a result of testing Hypothesis 3. "The experimental group that participated in the hypertension management program at a community health center will show lower anthropometric measurements (body weight and abdominal circumference) than the control group that did not participate in the hypertension management program," the body weight measured from the experimental group was  $62.19 \pm 8.39$  in the pre test and  $61.01 \pm 8.44$  in the post test, showing a significant difference statistically from the body weight measured from the control group that was  $64.64 \pm 12.67$  in the pretest and  $64.36 \pm 12.11$  in the post test ( $t=2.32$ ,  $p=.026$ ). Also, as a result of comparing the abdominal circumference between two groups, the experimental group showed  $89.24 \pm 8.76$  in the pretest and  $83.62 \pm 5.52$  in the post test while the control group showed  $85.41 \pm 8.48$  and  $84.36 \pm 12.11$  in the pretest and posttest, respectively, showing a significant difference between two groups. Therefore, Hypothesis 3 was supported ( $t=2.17$ ,  $p=0.036$ ).

As a result of testing Hypothesis 4. "The experimental group that participated in the hypertension management program at a community health center will show lower pressure levels than the control group that did not participate in the hypertension management program, " the systolic blood pressure measured from the experimental group was  $136.33 \pm 9.35$  in the pretest and  $118.81 \pm 10.71$  in the post test while the systolic blood pressure measured from the control group was  $138.18 \pm 10.53$  and  $124.55 \pm 6.71$  in the pretest and posttest, respectively, showing a significant difference statistically in the blood pressure in the pretest and posttest between two groups ( $t=7.70$ ,  $<.001$ ). The diastolic blood pressure measured from the experimental group was  $84.29 \pm 9.78$  and  $74.76 \pm 8.14$  in the pretest and the post test, respectively, showing a significant difference statistically from the diastolic blood pressure measured from the control group that was  $88.18 \pm 6.65$  and  $80.00 \pm 3.09$  in the pretest and the post test, respectively. Therefore, Hypothesis 4 was supported ( $t=5.91$ ,  $<.001$ ).

**Table 4. Comparison of Outcome Variable between Experimental and Control Group**

Variables	Groups	Pretest	Posttest	Difference	t	p	
		M±SD	M±SD	M±SD			
Hypertension related Knowledge	Exp. (n=21)	12.86± 2.24	18.10±1.38	-5.24± 2.10	-4.25	<.001	
	Cont. (n=22)	11.77± 2.83	11.64±2.50	0.14± 3.24			
Self-Efficacy	Exp. (n=21)	29.57± 3.61	34.48±2.86	-4.91± 5.14	-4.20	<.001	
	Cont. (n=22)	27.55± 4.55	28.86±2.92	-1.32± 3.76			
Blood Pressure	Systolic	Exp. (n=21)	136.33± 9.35	118.81±10.71	17.52±15.95	7.70	<.001
	Cont. (n=22)	138.18±10.53	124.55±6.71	13.64±10.02			
	Diastolic	Exp. (n=21)	84.29± 9.78	74.76±8.14	9.52±12.84	5.91	<.001
	Cont. (n=22)	88.18± 6.65	80.00±3.09	8.18± 5.89			
Body Weight	Exp. (n=21)	62.19± 8.39	61.01±8.44	1.12± 2.38	2.32	.026	
	Cont. (n=22)	64.64±12.67	64.36±12.11	0.27± 1.35			
Abdominal Circumference	Exp. (n=21)	89.24± 8.76	83.62±5.52	5.62± 4.84	2.17	.036	
	Cont. (n=22)	85.41± 8.48	85.68±9.12	-0.27± 9.17			

Exp.=Experimental group; Cont.=control group

## 4. Discussion

This study was carried out in order to identify the effects of hypertension management program at community health center on the hypertension-related knowledge, self-efficacy, anthropometric measurements and blood pressure of hypertensive patients. As a result, it was confirmed that the hypertension management program carried out in community health center was effective for increasing the disease-related knowledge and self-efficacy of hypertensive patients and decreasing their hypertension-related anthropometric measurements and blood pressure.

Chronic patients' disease-related knowledge is the fundamental element in the composition of educational program targeting patients and it is also essential for the treatment and management of the disease. In this study, the hypertension-related knowledge score of target patients after participating in the hypertension management program was 18.10 points which were higher than the control group's 11.64 points. This result is same as the result of the studies carried out by [25-26] indicating that there was an increase in hypertension-related knowledge after the participation in the hypertension management program and the result of study carried out by [19] indicating that there was an increase in hypertension-related knowledge after the participation in the case management program carried out by a community health center, and as shown in the result of study carried out by [27] indicating that greater hypertension-related knowledge ensures better execution of health behavior and blood pressure control, more positive effects on the blood pressure management can be expected as the level of hypertension-related knowledge is improved more. Especially, the participation of hypertensive patients in the hypertension management program at community health center reflects their willingness to treat and manage their health problem actively, and the provision of disease-related knowledge is a very meaningful result to fulfill the patients' desires to know as well as the starting point for correct disease management. However, as shown in the studies carried out by [19,28] indicating that the level of knowledge tends to decrease again over time after the disease-related education or case management is given, continuous and repetitive education rather than one-time education is necessary.

Self-efficacy is also a very important influential factor in the health promotion behavior and disease management, and its effect on the hypertension management also have been verified in various precedent studies. In this study, the self-efficacy increased from 29.57 to 34.38 after the participation in the hypertension management program at community health center, and this has been improved significantly in comparison to the self-efficacy of the control group. The hypertension management program in this study provided training to reinforce positive decision making and have self-confidence in order to improve the self-efficacy of the target patients while allowing them to share verbal expression and experience to each other, and compliment and encouragement were given separately to a target patient who actively participated in the education, so it is expected that this program would be effective for improving the self-efficacy. This result supports the result of precedent studies carried out by [25-26, 28] and verifies the importance to improve the self-efficacy through the participation in the hypertension management program in the same context with the result of the study carried out by [29] indicating that the effects of hypertension management according to the improvement of self-efficacy was confirmed. According to the result of studies carried out by [28] the degree of self-efficacy decreases over time just as hypertension-related knowledge, and in consideration of such fact, the key to a success in the management of hypertension is to improve and maintain self-efficacy continuously through an educational program provided for a certain period of time. The type of management method to improve the self-efficacy is also important. As shown in the study carried out by [30], the patients managed with the traditional management method of community health center showed higher self-efficacy than the patients managed through the remote management system. In the study carried out by [31], the self-efficacy of patients

who received individual health education carried out by a community health center was further improved, and this shows that the face-to-face education with each target patient in consideration of individual characteristics is more effective for improving the self-efficacy. Therefore, it would be possible to improve self-efficacy more if the instructor faces a patient personally through the hypertension management program at community health center and individualized education is also provided in the program.

It was confirmed that the hypertension management program was effective for weight loss and a decrease in the abdominal circumference of hypertensive patients. After participating in the hypertension management program, the experimental group showed a loss in weight by  $1.12 \pm 2.38$  and a decrease in abdominal circumference by  $5.62 \pm 4.84$ . Weight and abdominal circumference are major factors for predicting and increasing the degree of risk of metabolic syndrome including hypertension, and the precedent studies showed that the execution of weight control and drug therapy at the same time for the treatment of hypertension is more effective for controlling the blood pressure. Although it was difficult to compare directly since there were few studies that provide the relevant education only to hypertensive patients and the body weight abdominal circumference were measured, the result of the study carried out by [7] indicated that the body weight, waist measurement and blood pressure of women in 50s were reduced significantly after the hypertension and nutrition education based on community health center was provided. The result of this study also partially supports the result of the study carried out by [32] indicating that the participation in the exercise intervention program was effective for reducing body weight and waist measurement. The hypertension management program in this study shows the effects to reduce body weight and abdominal circumference through the combination of nutrition education and exercise program.

The ultimate goal of the operation of hypertension management program is to control blood pressure, and it is reported in various precedent studies that the blood pressure reduction effects were shown after various programs targeting hypertensive patients were carried out. The systolic blood pressure and diastolic blood pressure reduction effects were reported as the final effects of nutrition education, exercise intervention, knowledge and self-efficacy improvement program and case management carried out at a community health center [3,7,9,18,19,25-26,32]. Also, blood pressure control effects were shown after educational programs with various contents related to hypertension such as self-help group program or health incentive program were carried out by a local workplace or a medical institution [1, 28-29]. In this study, the systolic blood pressure of target patients participating in the hypertension management program was reduced from 136.33 to 118.81 and their diastolic blood pressure were also reduced by 9.52, showing greater blood pressure reduction effects than patients who received only drug therapy and partially reconfirming the result of precedent studies. Various programs targeting patients with chronic diseases such as hypertension and diabetes are operated in community health centers, but there are few programs targeting only hypertensive patients. The hypertension management program operated in this study targeted hypertensive patients, improving their hypertension-related knowledge and self-efficacy, and the nutrition education and exercise intervention were provided at the same time so that the blood pressure reduction effects were obtained. This result can be evaluated positively in the aspect that various effects shown from the precedent studies were obtained. This study has a significance that the principle of chronic disease management indicating that better blood pressure control effect can be obtained through the execution of diet therapy and exercise therapy at the same time for the hypertension management rather than depending only on medication and patients should be guided to develop self-management ability to reduce risk factors of hypertension through physical, psychosocial and multilateral approach has been reconfirmed.

## 5. Conclusion

This study aimed at verifying the effects of hypertension management program operated in a community

health center on the hypertension-related knowledge, self-efficacy, anthropometric measurements and blood pressure of hypertensive patients in local community.

Hypertension-related knowledge was provided and the self-efficacy improvement strategy was carried out at the same time for twice a week for a total of 8 weeks, and the program consisting of the education regarding nutrition, dietary control and exercise intervention was composed and carried out. As a result, the hypertensive patients' knowledge and self-efficacy were improved, and their weight and abdominal circumference as well as systolic blood pressure and diastolic blood pressure were reduced. Therefore, it was confirmed that multilateral approaches in terms of physical and psychosocial aspects only targeting hypertensive patients were required for managing hypertensive patients in local community.

A repetitive long-term follow-up study to verify the effects of hypertension management program and the continuity of such effects is necessary in future. In addition, a study to modify and apply such programs to other chronic patients besides hypertensive patients is suggested.

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