

Patient-centered counseling program using health coaching to promote self-care among elderly hypertension patients in the rural area of South Korea

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Objectives: This study investigated the effects of a coaching program on lifestyle modification among hypertensive patients in a rural area in South Korea. **Methods:** We implemented a patient-centered counseling program consisting of monthly face-to-face counseling and a weekly telephone check-up with patients having risk factors such as smoking, drinking alcohol lack of physical activity, or unbalanced diet for six months. We analyzed data of 489 patients who participated in the program from October 2013 to December 2016. **Results:** The program showed positive effects on knowledge (7.32 ± 1.96 to 9.03 ± 1.87 , $p < .001$), medication (6.61 ± 1.05 to 6.93 ± 0.58 , $p < .001$), diet (4.59 ± 1.24 to 5.07 ± 0.84 , $p < .001$), self efficacy (63.50 ± 16.25 to 74.73 ± 14.26 , $p < .001$), and health status (65.30 ± 18.20 to 75.50 ± 15.67 , $p < .001$). Lifestyle modification also reduced in smoking (9.0% to 6.1%, $p = .009$), and alcohol (39.5% to 35.2%, $p = .022$), and improved physical activity (63.2% to 84.0%, $p < .001$). Systolic blood pressure (132.9 ± 13.99 to 125.70 ± 11.10 , $p < .001$) and diastolic blood pressure (78.10 ± 9.71 to 74.70 ± 9.33 , $p < .001$) improved. In multilevel logistic regression, no practice of physical activity at the end (OR=0.333) and SBP control at the start (OR=3.460) were statistically significant for well-controlled SBP after adjusting the branch level. **Conclusion:** These results suggest that a patient-centered counseling management program using coaching can be implemented through health care workers in the community.

Key words: community health worker, counseling, hypertension, lifestyle modification, self-care

I. Introduction

Hypertension (HTN) is a major risk factor of cardiovascular disease (CVD) among various populations (World Health Organization [WHO], 2013). Well-controlled blood pressure (BP) has proven to reduce the risk of stroke, cardiovascular, all-cause mortality and heart failure (Briasoulis, Agarwal, Tousoulis, & Stefanadis,

2014). However, the rate of patients with well-controlled BP has hardly improved from 11.7% in 2000 to 13.8% in 2010 (Mills et al., 2016).

In Korea, prevalence of HTN was higher in rural areas (38.3%) than in urban areas (32.5%) in 2016. The prevalence of HTN is much higher in the population aged 65 years or older (65.2%) than in the population 30 years or older (33.5%) (Korea Center

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for Disease Control and Prevention [KCDC], 2017). There is a proportionately larger number of older adults in rural areas of Korea where HTN is a major health problem (Jeon, 2003).

HTN patients are asked to take medicine and change their lifelong habits. They need to know the risk of raised BP and how to control it (WHO, 2013). Traditional didactic education informing knowledge about HTN to patients and warning them of negative results shows no significant change (Clement, 1995). Behavioral changes can be elicited when patient's awareness, self-motivation, confidence are sufficient. Therefore, psychological influencers should be self-determined and show continuous efforts (Jo, Jung, & Lee, 2012). It requires a patient-centered approach for active involvement of patients and improvement of knowledge, higher compliance, and improved health (Hibbard, Greene, & Overton, 2013). Health counseling is known to be effective to change individual's health behavior because it enables identifying specific problem, providing appropriate information, finding and eliminating barriers (Kim, 2002). Patient-centered approaches such as motivational interviewing (MI) are known to promote lasting behavioral changes. The principles of MI are to resist, to understand, to listen, and to empower patients. It lays emphasis on stage of change and ambivalence of change. MI uses the skills of open-ended questions, affirmations, reflective listening, and summaries (Rosengren, 2013).

Health coaching is also a method to improve self-care and patient involvement (Huffman, 2009). It empowers patients through self-determined goals, achievement of small successes, and tailored learning with support (Wolever & Dreusicke, 2016). Coaching skills include active listening, open-ended questions, feedback, attitudes, and so on. Opening, goal setting, action planning, practicing, and feedback can be considered as a process. Coaching also considers patient's value and belief but it focuses more on patient's own goal and their practice (Ito, 2002).

The purpose of this study is to investigate the effects of counseling program based on coaching on HTN patients in the process of lifestyle modification at Public Health Center (PHC) branches. These findings would help to develop a patient-centered program to manage chronic conditions and to plan an education program for community health workers (CHW).

II. Methods

1. Study design and participants

Patients with a diagnosis of HTN and one or more risk factors such as smoking, drinking alcohol, lack of physical activity, or unbalanced diet were included. Thirty-two CHWs were included in this program at 23 PHC branches from October 2013 to December 2016. We requested each branch to recruit 10 patients a year. Five hundred sixty-nine patients participated and 552 completed the program. Data from 489 patients who filled out questionnaires were thoroughly analyzed. The study was approved by the Kangwon National University Hospital Institutional Review Board (IRB No. 2013-05-006).

2. Training of health care workers

We also developed a training program for CHWs who would be responsible for running a six-month counseling program. The training program was classified into two tracks: a basic course and an advanced course. We prepared a basic course for starter and 4 classes of advanced course for all (Table 1). Training program was run in a participatory manner. For a team exercise, CHWs had the time to think about and make a presentation on given themes. CHWs evaluated achievement of the counseling on their work in the last month and shared their successes and pitfalls. They also suggested own ideas to improve in further counseling.

〈Table 1〉 Training program for a community health worker to be a coach

Title	Contents	Way	Time (hours)
Basic course			
Introduction	Introduction of training program	Lecture	1.0
Opening	Team building	Lecture	2.0
	Necessity of self-care and support of chronic disease in community	Quiz	
Case introduction	9988 patient-centered counseling program in public health care branch	Lecture Question & Answer	1.0
Sense of duty	Needs and barriers to control HTN	Lecture	2.0
	Competence as community health worker	Team exercise	
Behavioral change & coaching	Explanation of behavioral change in health	Lecture	2.0
	Coaching as a tool to change health behavior	Quiz	
	Coaching skills and process	Team exercise	
Practice of coaching	Demonstration of coaching conversation	Role play	1.0
	Role play of coach, patient, and observer		
Mastering protocol	Contents of protocol	Lecture	1.0
	Forms, annex, materials for program	Question & Answer	
Closing	Building action plan to be a coach	Self declaration	1.0
Advanced course			
Practice of goal setting	Goal setting in coaching	Lecture	2.0
	Introduction of charged patient's goal	Quiz	
	Checking their goal	Role play	
	Making best goal	Team exercise	
Practice of success feedback	Success feedback in coaching	Lecture	2.0
	Introduction of charged patient who did achieve his or her goal well	Quiz	
	Making success feedback to his or her achievement	Role play Team activity	
Practice of change feedback	Change feedback in coaching	Lecture	2.0
	Introduction of charged patient who didn't achieve his or her goal	Quiz	
	Making change feedback to his or her behavioral change	Role play Team exercise	
Practice of telephone check up	Telephone counseling	Lecture	2.0
	Practice of telephone check up	Role play	
	Tips to do telephone check up well	Team exercise	

3. Counseling program for patients

We developed a patient-centered six month counseling program consisting of monthly face-to-face counseling and weekly a telephone check up (Table 2). CHWs enrolled HTN patients with one or more risk factors in lifestyle and provided a counseling program. At their first visit, the counselors discovered each patients' thoughts about his or her

life, health, and management of HTN. It is important to build rapport in order to successfully manage HTN. Then CHWs encouraged patients to select any aspect of their life that they wish to change in terms of lifestyle and to set appropriate goals. CHWs were guided to spend 10~15 minutes per monthly counseling and we recommended CHWs to spend enough time as much as 30 minutes at first visit for better rapport (Table 2).

〈Table 2〉 To do list and key questions in flow of patient centered counseling

Counseling	To do	Key questions
Face to face		
Registration		Make an agreement to participate program Health examination, pre test
1 st visit	○ Digging patient's thought about health and HTN management	What are most important things in your life?
		What do you think as living healthy?
		What do you think about managing HTN?
	○ Goal setting	What would be helpful to manage HTN?
		What do you mostly want to change or improve? (ex. diet, physical activity, knowledge, etc.)
2 nd ~ 5 th visit	○ Action plan / monthly goal	How much do you make well about OOO now? How much do you want to achieve in 6 months?
	○ Appointment of telephone call	What can you do this month to achieve 6 month goal?
	○ Check up of monthly goal	I'll call you once a week to help you get to your goal. What day of the week do you prefer to make a call? What time is convenient to you have a call?
		How about your achievement of goal? How much do score for your effort to practice?
○ Good and bad things of last month	What are good things for last month? What are key points to success? What are bad things for last month? What are ways to overcome?	
	○ Action plan / monthly goal	What can you do this month to achieve 6 month goal?
	○ Modification of goal	When goal has not achieved more than 2 months.
6 th visit		Health examination, Post test
	○ Check up of goal, changes and looking back	What have you changed for last 6 months? How much do you achieve your goal? How do you feel last 6 months?
		○ Affirmation patients' thoughts
	○ Future plan	
	○ Completion ceremony	Certificate of completion Declaration of future action plan
Telephone		
Check up of goal		How about your achievement of goal? What did help you to achieve the goal? What make you difficult to achieve the goal?
Check up of self care	○ Medication	How many days did you take your blood pressure pills in the past 7 days? How many days did you take your blood pressure pills at the same time of the day in the past 7 days?

Counseling	To do	Key questions
Check up of lifestyle	○ Diet	How many days did you not eat salted food in the past 7 days?
		How many days did you eat more than 5 times of fruits and vegetables in the past 7 days?
		How many days did you not use salt at the table in the past 7 days?
	○ Smoking	How much have you smoked a day in the past 7 days?
		How many times have you drunken alcohol in the past 7 days?
	○ Alcohol	How much have you drunken alcohol per one time in the past 7 days?
How many times have you done physical activity in the past 7 days?		
○ Physical activity	How much have you done physical activity per one-time in the past 7 days?	
	Encourage to achieve goal and support	

Note. ‘OOO’ is what patient decide to change for 6 months.

4. Measurements

We examined each patients’ health status, asked him or her to answer a questionnaire at the first and last visits, and compared the changes over the six months. We measured systolic BP (SBP) and diastolic BP (DBP) during each visit. We collected items of knowledge, self-efficacy, management, behavioral change, and health status. We did not check about complications and did not include patients with severe disease such as CVD. Cardiologist, Preventive Medicine Specialist, doctor of public health developed the items by a thorough review with members of PHC branches. We also received psychologist’s guidance on the items of self-efficacy.

The knowledge questions consisted of 11 items. We selected 9 items among 21 items used by Han et al. (2011). These items were as follows: “If your mother or father has HTN, your chance of getting it is higher”, “Young adults don’t become hypertensive”, “HTN always has symptoms”, “HTN is not life-threatening”, “If you’re overweight, you’re 2~6 times more likely to develop HTN”, “Regular exercise can help reducing BP”, “Drinking alcohol lowers BP”, “BP gets lower in cold weather”, and “HTN is if when SBP is as same as or over 140 mmHg or when DBP is as same as or over 90 mmHg.” We modified the last one into two items as

follows: “HTN is when SBP is as same as or over OOO mmHg” and “HTN is when DBP is as same as or over OOO mmHg.” We also selected the item ‘Would lowering high BP improve a person’s health?’ among 8 items used by Oliveria et al. (2005). For each item, patients were requested to answer yes or no. We gave a score of 1 when they answered correctly and gave a score of 0 for incorrect answers. We calculated knowledge score by totaling their scores. Internal consistency of knowledge was 0.700. Self-efficacy consisted of ‘I know well about HTN’ and ‘I can manage HTN well’. Each item scored 0~100 and internal consistency was 0.806 (Cronbach’s *α*). We asked health status by ‘How good or bad is your health today?’ using Visual Analog Scale ranged from 0 to 100.

We categorized smoking into current smokers and non-smokers including ex-smokers. ‘Drinking alcohol’ was divided into those who drink and those who do not. Physical activity was grouped as exercise and no exercise. We also collected information on the amount of daily cigarettes, monthly frequency and amount of alcohol by bottles, and weekly frequency and amount of exercise by minutes. We calculated monthly amount of alcohol by multiplication of monthly frequency and amount of alcohol per one ‘time. We asked about self-care using 5 items among

31 items proposed by Warren-Findlow & Seymour (2011). Items were classified into medication with 'How many days did you take your BP pills in the past 7 days?', 'How many days did you take your BP pills at the same time of the day in the past 7 days?', diet with 'How many days did you not eat salted food in the past 7 days?', 'How many days did you eat more than 5 times of fruits and vegetables in the past 7 days?', and 'How many days did you not use salt at the table in the past 7 days?'. We asked about the last one week and scored each item from 0 when participants answered he or she did something 0 day in the past 7 days to 7 when participants answered he or she did something all 7 days in the past week. Internal consistency for medication was 0.882 and 0.071 for diet (Cronbach's α). In this study, we set the BP goal as 140/90mmHg. For BP control, we only considered patients with SBP<140mmHg and DBP<90mmHg as 'adequate'.

5. Data analysis

We compared knowledge, self-care, and self-efficacy for each item and sub total score by paired t-test. We calculated monthly amount of drinking and exercise by multiplication of frequency and amount. We analyzed changes of self-care, self-efficacy, health status, amount of smoking, frequency of drinking, amount of drinking, frequency of exercise, amount of exercise, BP, and body mass index by paired t-test. We also compared health behaviors and BP in categorized form using McNemar's test. We did multilevel logistic regression to investigate factors associated with achieving well-controlled BP after the program.

We set individual level model as follows:

$\text{logit}(\text{achieving well controlled BP}) = \beta_0j + \beta_1j^*(\text{age group}) + \beta_2j^*(\text{gender}) + \beta_3j^*(\text{knowledge score}) + \beta_4j^*(\text{medication score}) + \beta_5j^*(\text{diet of salted food}) + \beta_6j^*(\text{diet of fruits and vegetables}) + \beta_7j^*(\text{diet of using salt}) + \beta_8j^*(\text{smoking}) + \beta_9j^*(\text{alcohol drinking}) + \beta_{10}j^*(\text{physical activity}) + \beta_{11}j^*(\text{blood pressure control at the beginning})$

$\beta_0j = \gamma_{00} + \gamma_{01}^*(\text{year}) + \gamma_{02}^*(\text{branch ID}) + \mu_{0j}$

We set branch level model as follows:

$\beta_0j = \gamma_{00} + \gamma_{01}^*(\text{year}) + \gamma_{02}^*(\text{branch ID}) + \mu_{0j}$

Multilevel logistic regression; model I only included factors of individual level and used data at the end of the program for target and $\beta_1 \sim \beta_{10}$. Model II added year and branch identification (ID) as factors of branch level. We built models with target as well-controlled BP, well-controlled SBP, and well-controlled DBP and showed well-controlled SBP which was fit. Its Intra class correlation (ICC) was 0.423. We considered p-value <.05 as significant and used SPSS version 25.0 (SPSS Inc., Chicago, IL, USA).

III. Results

The mean score of knowledge about HTN increased from 7.32 ± 1.96 to 9.03 ± 1.87 ($p < .001$). All the items except 'Drinking alcohol lowers BP' ($p = .206$) showed increased scores. Knowledge about diagnostic criteria of HTN of SBP increased from 0.28 ± 0.45 to 0.63 ± 0.48 ($p < .001$) and that of DBP also increased from 0.27 ± 0.50 to 0.57 ± 0.50 (Table 3).

Self-care score increased in both medication and diet. Medication day per week increased from 6.77 ± 0.99 to 6.94 ± 0.57 ($p < .001$) and timely medication per week also increased from 6.46 ± 1.39 to 6.92 ± 0.60 ($p < .001$). Score of not eating salted food increased from 5.22 ± 2.35 to 6.24 ± 1.41 ($p < .001$) and that of not adding salt increased from 6.55 ± 1.22 to 6.91 ± 0.56 ($p < .001$). Self-efficacy increased significantly. 'I know well about HTN' increased from 61.69 ± 18.70 to 73.97 ± 15.32 ($p < .001$). 'I can manage HTN well' increased from 65.34 ± 18.20 to 75.52 ± 15.67 ($p < .001$) (Table 3).

〈Table 3〉 Changes of knowledge, self-care and self-efficacy of participants

unit: mean±SD

Items	Pre	Post	t value	p-value
Knowledge				
Diagnostic criteria of HTN of SBP	0.28±0.45	0.63±0.48	-13.190	.000
Diagnostic criteria of HTN of DBP	0.27±0.50	0.57±0.50	-10.737	.000
If your mother or father has HTN, your chance of getting it is higher.	0.73±0.44	0.90±0.30	-7.801	.000
Young adults don't become hypertensive.	0.71±0.46	0.86±0.35	-6.344	.000
HTN always has symptoms.	0.43±0.50	0.71±0.45	-10.729	.000
HTN is not life-threatening.	0.69±0.47	0.80±0.40	-4.840	.000
If you're overweight, you're two to six times more likely to develop HTN.	0.88±0.32	0.93±0.26	-2.637	.009
Regular exercise can help reducing BP.	0.96±0.21	0.99±0.12	-2.805	.005
Drinking alcohol lowers BP.	0.84±0.37	0.87±0.34	-1.266	.206
BP gets lower in cold weather.	0.60±0.49	0.80±0.40	-7.924	.000
Would lowering high blood pressure improve a person's health?	0.94±0.23	0.98±0.13	-3.578	.000
Sub total	7.32±1.96	9.03±1.87	-17.306	.000
Self-care				
Medication				
How many days did you take your blood pressure pills in the past 7 days?	6.77±0.99	6.94±0.57	-3.661	.000
How many days did you take your blood pressure pills at the same time of the day in the past 7 days?	6.46±1.39	6.92±0.60	-7.093	.000
Sub total	6.61±1.05	6.93±0.58	-6.394	.000
Diet				
How many days did you not eat salted food in the past 7 days?	5.22±2.35	6.24±1.41	-9.073	.000
How many days did you eat more than 5 times of fruits and vegetables in the past 7 days?	1.99±2.49	2.06±2.11	-0.577	.564
How many days did you not use salt at the table in the past 7 days?	6.55±1.22	6.91±0.56	-6.256	.000
Sub total	4.59±1.24	5.07±0.84	-8.373	.000
Self-efficacy				
I Know well about HTN	61.69±18.70	73.97±15.32	-15.301	.000
I can manage HTN well	65.34±18.20	75.52±15.67	-13.173	.000
Sub total	63.50±16.25	74.73±14.26	-16.469	.000

Patients' health status score increased significantly from 65.30 ± 18.20 to 75.50 ± 15.67 ($p < .001$). They also showed major improvements in health behaviors. The number of smokers decreased by 31.8% from 44 (9.1%) to 30 (6.1%) ($p = .009$). Daily amount of cigarettes decreased from 12.80 ± 8.63 to 9.20 ± 8.98 ($p = .011$). The number of alcohol drinkers decreased by 10.9% from 193 (39.5%) to 172 (35.2%) ($p = .022$). Frequency of drinking decreased from 7.60 ± 9.23 to 5.40 ± 7.41 per month ($p = .001$) and amount of alcohol intake also decreased from 0.70 ± 0.49 to 0.60 ± 0.47 bottles a time

($p = .003$). Therefore, monthly amount of alcohol intake decreased from 8.00 ± 13.08 to 4.60 ± 7.39 bottles ($p = .001$). People who exercise increased from 309 (63.2%) to 411 (84.0%) ($p < .001$), so 102 of 180 (56.7%) patients who had not exercised started to exercise after counseling. Frequency of exercise increased from 2.90 ± 2.54 to 4.10 ± 2.10 a week ($p < .001$) and amount of exercise also increased from 29.80 ± 21.15 to 40.40 ± 13.08 minutes at a time ($p < .001$). Thus, monthly amount of physical activity increased from 502.70 ± 480.30 to 717.68 ± 438.80 minutes ($p < .001$) (Table 4).

〈Table 4〉 Changes of health status, lifestyle and blood pressure

unit: n(%), mean \pm SD

Items	Pre	Post	t value	p-value
Health status	65.30 \pm 18.20	75.50 \pm 15.67	-13.173	.000
Smoking				
Smoker	44 (9.0)	30 (6.1)	N/A	.009
Non smoker	445 (91.0)	459 (93.9)		
Amount of smoking (cigarettes) ¹⁾	12.80 \pm 8.63	9.20 \pm 8.98	2.644	.011
Alcohol drinking				
Alcohol	193 (39.5)	172 (35.2)	N/A	.022
No alcohol	296 (60.5)	317 (64.8)		
Frequency of drinking	7.60 \pm 9.23	5.40 \pm 7.41	3.570	.001
Amount of drinking (bottles) ²⁾	0.70 \pm 0.49	0.60 \pm 0.47	2.988	.003
Monthly amount of drinking	8.00 \pm 13.08	4.60 \pm 7.39	3.429	.001
Physical activity				
Exercise	309 (63.2)	411 (84.0)	N/A	.000
No exercise	180 (36.8)	78 (16.0)		
Frequency of exercise	2.90 \pm 2.54	4.10 \pm 2.10	-8.967	.000
Amount of exercise (minutes) ³⁾	29.80 \pm 21.15	40.40 \pm 13.08	-9.910	.000
Monthly amount of exercise	502.70 \pm 480.30	717.68 \pm 438.80	-8.886	.000
Systolic blood pressure (mmHg)	132.90 \pm 13.99	125.70 \pm 11.10	10.456	.000
Diastolic blood pressure (mmHg)	78.10 \pm 9.71	74.70 \pm 9.33	6.624	.000
Blood pressure control				
Adequate	322 (65.8)	416 (85.1)	N/A	.000
Inadequate	167 (34.2)	73 (14.9)		
BMI ⁴⁾ (kg/m ²)	27.10 \pm 11.64	25.80 \pm 7.25	2.664	.011

Note. ¹⁾ N=45, ²⁾ N=111, ³⁾ N=426, ⁴⁾ N=333

The number of participants with well-controlled BP increased from 322 (65.8%) to 416 (85.1%) ($p < .001$). Mean of SBP decreased from 132.90 ± 13.99 to 125.70 ± 11.10 mmHg ($p < .001$) and that of DBP also decreased from 78.10 ± 9.71 to 74.70 ± 9.33 mmHg ($p < .001$). BMI also decreased from 27.10 ± 11.64 to 25.80 ± 7.25 ($p = .011$) (Table 4).

In multilevel logistic regression, gender, physical activity at the end and SBP control at the beginning showed significant OR in model I. Physical activity

at the end and SBP control at the beginning presented significant OR also in model II. Patients who did not practice physical activity were less likely to have (OR=0.333) well-controlled SBP at the end compared to those who participated in physical activity. Patients who had well-controlled SBP at the start were more likely to have (OR=3.460) well-controlled SBP at the end in comparison to who did not start with well-controlled SBP from the beginning (Table 5).

(Table 5) Factors associated with well controlled systolic blood pressure after program

Fixed effect	Model I		Model II	
	OR	(95% CI)	OR	(95% CI)
Intercept	295.056	(0.008-11519523.809)	951.846	(0.018-51176887.091)
Individual level				
Age				
< 60 years	0.902	(0.185-4.398)	1.132	(0.211-6.074)
60 years ≤ < 70 years	1.010	(0.266-3.835)	1.181	(0.291-4.791)
70 years ≤ < 80 years	0.610	(0.187-1.988)	0.655	(0.199-2.152)
Gender	0.445**	(0.206-0.960)	0.507	(0.224-1.144)
Knowledge	0.964	(0.824-1.128)	0.909	(0.702-1.178)
Medication	0.664	(0.172-2.561)	0.838	(0.237-2.954)
Diet of salted food	1.001	(0.807-1.242)	1.021	(0.786-1.326)
Diet of fruits and vegetables	0.945	(0.802-1.115)	1.006	(0.825-1.227)
Diet of using salt	0.958	(0.674-1.362)	0.968	(0.514-1.824)
Smoking	1.756	(0.628-4.905)	1.834	(0.563-5.974)
Alcohol drinking	0.613	(0.280-1.342)	0.492	(0.212-1.143)
Physical activity	0.377**	(0.182-0.781)	0.333**	(0.140-0.795)
Blood pressure control	3.146**	(1.658-5.972)	3.460**	(1.736-6.897)
Branch level				
Year				
the 1 st year			0.450	(0.061-3.309)
the 2 nd year			0.991	(0.142-6.906)
Branch ID				
Branch 1			0.199	(0.002-19.735)
Branch 2			0.133	(0.001-13.834)
Branch 3			0.056	(0.001-4.564)

Fixed effect	Model I		Model II	
	OR	(95% CI)	OR	(95% CI)
Branch 4			0.499	(0.000-788.949)
Branch 5			0.074	(0.001-4.041)
Branch 6			0.082	(0.001-5.948)
Branch 7			0.076	(0.001-5.033)
Branch 8			0.115	(0.002-7.375)
Branch 9			0.490	(0.002-107.144)
Branch 10			0.408	(0.005-34.922)
Branch 11			0.060	(0.001-4.171)
Branch 12			0.088	(0.001-8.941)
Branch 13			0.020	(0.000-1.194)
Branch 14			0.032	(0.001-1.854)
Branch 15			0.319	(0.004-24.940)
Branch 16			0.051	(0.001-3.533)
Branch 17			0.142	(0.002-9.705)
Branch 18			0.025	(0.000-1.754)
Branch 19			0.181	(0.003-11.818)
Branch 20			0.049	(0.001-3.480)
Branch 21			0.038	(0.000-3.376)
Branch 22			0.042	(0.001-2.278)

Reference are as follows: age=80years≤, gender=female, smoking=yes, alcohol drinking=yes, physical activity=yes, blood pressure control=not adequate, year=the 3rd year, branch=branch 23, **p<.05

IV. Discussion

This study investigated the effects of counseling program on HTN patients lifestyle modification at PHC branches. It showed significant improvements in knowledge, medication compliance, diet, self-efficacy, health status, smoking, drinking alcohol, exercise, SBP, and DBP.

Positive changes were evident after the counseling program. Firstly, patients became more knowledgeable about HTN. Patients answered 10 out of items correctly except the 'drinking alcohol lowers BP' item. For items like 'If your mother or father has HTN, your chance of getting it is higher' and 'HTN is not life-threatening', only 30~40% of patients answered correctly before coaching but 60~70% of

the patients learned the right answer. Meanwhile patients seem to already have a good level of knowledge since the average value of the sum of knowledge items changed from 7.32 to 9.03 (Table 3), coaching seems to contribute to raise patients' knowledge of HTN. Improved knowledge itself does not elicit a behavioral change, but certainly provides the basis (Gu, Zhang, Wang, Zhang, & Chen, 2014).

Secondly, patients showed better medication compliance, diet, smoking, drinking alcohol, exercise, and weight loss with increased self-efficacy. Both the days of medication taken and the rate of timely medication increased. Reduced salt intake was encouraged but patients did not consume more fruits or vegetables than before. Gu et al. reported that patients who know the relation between BP and salt

intake are more likely to control HTN (Gu et al., 2014). Unchanged intake of fruit or vegetable seems related to the high cost and lack of systemized supply of fruits in the rural area where the patients reside. A previous study reported that older adults in a rural area ate more vegetables but less fruits in comparison with those in urban area (Kim, Seo, Kwon, & Cho, 2012). Another study also reported that older adults have the difficulty of making salad with sauce (Bae et al., 2019). Thirty-two percent of patients quit smoking, 11% of patients quit alcohol, and 57% of patients started exercise through this program. These desirable changes in lifestyle seem to come from raised awareness and self-efficacy. Hypertensive patients who lack knowledge of the HTN disease are unlikely to adhere to recommended treatments strictly (Whelton et al., 2018). In self-efficacy, both items of 'I know HTN well' and 'I can manage HTN well' increased significantly. Ding et al. reported self-efficacy as a major clue to bring better self-management and HTN control (Ding, Li, Su, Yuan, & Lin, 2018). In this program, patients had the chance to make daily goals and receive assistance to achieve their goals. They experienced a sense of achievement in lifestyle modification and became more proficient on how to do so than before.

Thirdly, patients became more able to control both SBP and DBP. SBP decreased significantly from 133 mmHg to 126 mmHg and DBP decreased from 78 mmHg to 75 mmHg. In this study, the BP goal was 120/80 mmHg and the rate of reaching the goal increased from 66% to 85%. Patients taking the medicine regularly, consuming less salt, and doing more exercise also seem to have improved BP. It is unclear whether the decrease in BP is due to increased drug compliance or other behavioral changes. Besides pharmaceutical treatment, best-proven non-pharmacologic interventions for

treatment of HTN are weight loss, healthy diet, reduced intake of sodium, enhanced intake of potassium, physical activity, and moderation in alcohol intake (Whelton et al., 2018). The following behavior change induces to lower SBP in hypertensive patients: 1) Weight loss, -5 mmHg; 2) healthy diet such as Dietary Approaches to Stop HTN (DASH) dietary pattern, -11 mmHg; 3) reduced intake of dietary sodium, -5 mmHg; 4) enhanced intake of dietary potassium, -4 mmHg; 5) physical activity, -4~6 mmHg; 6) moderation in alcohol intake (men \leq two glasses of alcohol daily, women \leq one glass of alcohol daily), -4 mmHg (Whelton et al., 2018). We analyzed additionally multilevel logistic regression to investigate factors associated with achieving well-controlled BP after the program. It showed no practice of physical activity at the end (OR=0.333) and SBP control at the start (OR=3.460) are statistically significant to achieve well-controlled SBP after adjusting branch level. Exercise training including endurance, dynamic resistance, and isometric resistance training is known to lower SBP and DBP (Carnelissen & Smart, 2013). However, we did not analyze the kind of exercise that the participants did. Maintaining well-controlled SBP and encouraging patients partake in physical activity would be helpful to manage SBP in community.

This study has some limitations. Firstly, it is difficult to conclude whether the effects are only owing to our counseling program because there is no control group. Some patients may show improvements solely by chance and some patients may get worse. This is a major limitation, but this study is based on a community program through PHC branches, making recruiting control group not possible. It is uncertain whether coaching is the best tools in counseling since there is no comparable group with other counseling approaches including motivational interviewing or cognitive behavioral therapy. We

recognize the potential difficulty in CHWs' drawing behavioral changes from the deep-intertwined psychological aspects of ambivalence or cognitive dissonance. It seems more convenient to apply coaching as a counseling tool that focuses on goal setting, making action plan, and supporting older adults in a rural area.

Secondly, most of the patients are older adults in the rural area, more than half of the patients are as same as seventy years old or older. Older adults are less likely to change their lifestyle even those with chronic diseases. PHCs are exceptional in urban areas, but older adults residing in the urban area are less likely to visit PHCs for their treatment of disease, making it difficult to apply the same program to them.

Thirdly, HTN control is meaningful when it prevents complications including heart attack, heart failure, stroke, and kidney failure (WHO, 2013). However, six month is relatively short to check whether complications of new onset. It is unknown whether BP control through the counseling program could ultimately prevent complications, a limitation of most educational program research. Through our study, we present BP control in this study but it is well known that if HTN is detected early and treated appropriately, mortality or morbidity risks can be minimized (WHO, 2013; Briasoulis et al., 2014).

Lastly, this counseling program did not include a detailed meal management. In this study, items used to check diet showed low internal consistency. Patients showed improvement in diet associated with salt but did not so in diet associated with fruits and vegetables. Various dietary modifications are known to be beneficial in the treatment of hypertension, including reduction of sodium intake; moderation of alcohol intake; and consumption of fruits, vegetables, legumes, and low-fat dairy products intake, and lowering snacks, sweets, meat, and saturated fat

intake. DASH diet program by a professional nutritionist significantly reduces SBP from 136 mmHg to 126 mmHg in Korea (Jo et al. 2006). This program focuses on helping patients understand themselves and implement their own needs so that they may be free from having to adjust their meals. It would be better to provide a structured curriculum for BP-lowering meals, diet education, counseling protocol, or community meal program in the future.

We did not analyze relations between comorbidities and BP control. Some studies report the need for better BP control in patients with comorbidities (Bramlage et al., 2010; Yang et al., 2017). Another study reported failed HTN control in patients with comorbidities (Gu et al., 2014). We focus on patients without comorbidities but with risk factors.

This study has strengths in two perspectives. First is the training of CHWs as health coaches works. CHWs are professionals who support healthcare and have a close understanding of communities through shared culture, language, and life experiences (Centers for Disease Control and Prevention (US), 2015). Health coaching by health workers has emerged as an effective model for reduction of CV risks (Willard-Grace, Chen, Hessler, Bodenheimer, & Thom, 2015) including HTN (Margolius et al., 2012; Dye, Williams, & Evatt, 2015; Thom et al., 2015). One study demonstrated the improvement of HTN management among rural residents aged 60 years or older through education and support with trained community volunteers (Dye et al., 2015). There are studies that illustrate that health coaching improves BP control and more coaching encounters elicit a greater reduction in BP (Margolius et al., 2012), and health coaching improves medication compliance (Thom et al., 2015). This study develops a successful education and practice guide for CHWs in health coaching and it seems to work successfully, implicating that we can increase the health indices of hypertensive patients by

introducing health coaching with community resources. In addition, the program can be extended to the entire public health network.

The other strength is that coaching brings about desirable changes in lifestyle and BP control on older adults, changing the way of education into a patient-centered interactive form. In our coaching program, patients play an important role through increased level of knowledge, self-efficacy and changing lifestyle. Health coaching covers various setting such as clinical practice, primary care, and health promotion program (Yoon et al., 2013; Eom, & Lee, 2017). Health coaching incorporates patient education, navigation, collaborative goal setting, and personal support, which are components of the Chronic Care Model (Glasgow, Orleans, Wagner, Curry, & Solberg, 2001). It requires encouraging informed and activated patients who have the skills and confidence to manage their health and also prepared, proactive providers who have the information, resources, and time to ensure and deliver effective intervention (Glasgow et al., 2001).

A meta-analysis of randomized controlled trials practicing 6 months or more comparing the effect of implementation strategies versus usual hypertensive care on BP reduction clearly demonstrates that multi-component strategies at the health system, provider, and patient levels are essential for BP control (Mills et al., 2018). Implementation strategies on SBP reduction are as follows: team-based care with titration by non-physician, -7.1 mmHg; team-based care with titration by physician, -6.2 mmHg; multilevel strategy without team-based care, -5.0 mmHg; health coaching, -3.9 mmHg; electronic decision-support system, -3.7 mmHg; home BP monitoring, -2.7 mmHg; provider training, -1.4 mmHg; audit and feedback, -0.8 mmHg. Multilevel, multicomponent strategies may yield the best results, but we suggest that the patient-level strategies of

health coaching, home BP monitoring combination are as effective due to limited resources (Mills et al., 2018).

In this study, we conduct a patient-centered counseling program that provides education through interactive communication between CHW and patients. A health coach and patient should be determined to collaborate on achieving common goals using self-discovery, self-monitoring, and active learning to improve lifestyle and BP. As the importance of management by patients themselves in daily life is increasing, it is desirable to provide coaching education. Despite some limitations, this program for hypertensive patients shows positive effects on knowledge, self-care, lifestyle modification, and BP control. This study also demonstrates that training and supporting health care workers for patient-centered counseling management program based on coaching can be implemented in the community.

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