

# Evaluation of a Community Health Practitioner Self-care Program for Rural Korean Patients with Osteoarthritis

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**Purpose:** The purpose of this study was to evaluate a self-care program for elders with osteoarthritis managed by primary health care workers, Community Health Practitioners (CHPs), in rural Korea. **Methods:** The self-care program, consisting of 7 areas, was evaluated with a randomized experimental study for patients over age 60 with osteoarthritis in which 150 participants in the experimental group and 140 in the control group were compared. The self-care program was implemented for six weeks, 2 hours per week, at community health posts by CHPs. Data were collected using an interview questionnaire given by the CHPs and laboratory tests before and after the intervention for both groups. Propensity score matching analysis was done to test effectiveness after controlling for confounding variables. **Results:** The intervention group showed a significant decrease in the number of painful joints ( $p < .001$ ) and a significant increase in self-care ability ( $p < .05$ ) compared to the control group. **Conclusion:** Study results indicate that training and utilizing primary health care workers in rural areas is valuable in increasing the generalization and continuity of intervention programs. As arthritis should be managed life-long, CHP directed self-care programs are useful interventions for rural elders with arthritis to learn self-care management.

**Key words:** Osteoarthritis; Self care; Program evaluation; Propensity score

## INTRODUCTION

The prevalence of arthritis is one of the highest among self-perceived medical symptoms. According to a national health survey in Korea, 28.9% of those aged 30 years and older had high blood pressure and 14.7% of those aged 50 years and older had arthritis. However, those who had arthritis had lower EQ-5D index, which means the quality of life, 0.811, than those who had high blood pressure, 0.896. (Ministry of Health and Welfare [MOHW], 2011)

According to 2007-2009 National Health Interview Survey of U.S.A, 22.2% of those aged 18 years and older had self-reported doctor-diagnosed arthritis, and 9.4% had activity limitations due to arthritis (Cen-

ters for Disease Control and Prevention [CDC], 2010). Arthritis is the most prevalent health condition among seniors and it causes significant pain and disability (Devos-Comby, Cronan, & Roesch, 2006). In addition, arthritis leads activity limitation associated with joint symptoms and reduction of health-related quality of life included physical and mental health (Cook, Pietrobon, & Hegedus, 2007).

Since arthritis should be managed life-long, self-care management is a useful intervention for elderly arthritis patients. The 6-week Arthritis Self-care Management (ASCM) Program developed by Lorig and colleagues at Stanford University in the early 1980s has been used widely in studies and has shown significant changes in pain, health status, and self-care ability (Lorig et al., 1989). Many other studies have used Lorig's

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ASCM and have reported significant changes in pain and self-care ability (Nuñez, Keller, & Ananian, 2009; Osborne, Wilson, Lorig, & McColl, 2007; Yip et al., 2007). Also, self-care management has been recommended by the CDC for arthritis patients in the United States. The CDC self-care program consisted of the following components: a) techniques to deal with problems such as pain, fatigue, frustration, and isolation; b) appropriate exercise for maintaining and improving strength, flexibility, and endurance; c) appropriate use of medications; d) communicating effectively with family, friends, and health professionals; e) healthy eating; f) making informed treatment decisions; g) disease related problem-solving; and h) getting a good night's sleep (CDC, 2011).

The Korean Rheumatology Health Professionals Society (KRHPS) developed a 6-week Self-help Health Promotion Program (SHP) for arthritis patients (KRHPS, 1999). The SHP consisted of 6 areas: 1) principles of self-care and arthritis; 2) exercise and pain management; 3) endurance exercise and individual evaluation; 4) nutrition and problem-solving methods; 5) folk remedies and communication; and 6) arthritis medication and self-control methods. Lee et al. (2002) reported the effectiveness of SHP intervention during 1997-2001 for 845 arthritis patients in one community. Pain, flexibility, depression, and self-efficiency were significantly improved; however, since this study only used a single pre-post comparison population, there are issues with the validity of the study results.

There have been studies on arthritis implemented in primary health care settings. Lee et al. (2001) implemented a study at a health center and community health post and reported that the experimental group showed significantly better pain status, self-efficiency, and muscle strength than the control group. Choi (2001) also used SHP as an intervention at a community health post and reported no changes to pain and fatigue, but significant improvement to self-efficiency. Kim et al. (2003) also evaluated the effectiveness of SHP and reported significant improvement to self-care ability and flexibility.

Problems with previous studies implemented in Korea have been lack of validity, generalization, and dissemination. The studies were implemented only in certain areas, so the study results cannot be generalized to other areas. Most of the interventions were implemented by researchers, so the SHP was not easily disseminated by other health care providers. To solve these problems, this study covered various areas to increase generalization and was provided by Community Health Practitioners (CHP) who had been trained by researchers.

Because of the World Health Organization (WHO) Alma-Ata Declaration in 1978, the community health post was developed as a major pri-

mary health care setting in rural areas in Korea in 1980. Each community health post covers about 500-1000 people (Kim et al., 2010) and is managed by one CHP. The CHP is a registered nurse who receives 6 months of primary health care training. They have been providing primary health care services in rural areas since 1981, including medical treatment and prescribing medications. Since the nurses were not able to provide medical treatment and prescription medications by 'Medical Law', the Korean government made a 'Special Law for Rural Areas' in 1980 to support the activities of the CHPs. There are 1,912 CHPs working at the community level in the health care delivery system in Korea (MOHW, 2010). The CHPs manage all the health problems for people in the community and the activities of the CHPs are covered by national medical insurance. The CHPs have been improving health accessibility and have been shown to be cost-effective primary health care providers in rural areas (Kim, 2004; Lee, & Ko, 2002; Oh, 2003). Health care for elderly populations in rural areas is important, since there are twice as many elderly living in rural areas than in the city. This study was implemented at the community health posts in 4 provinces and the intervention, a self-care program (SCP) that was modified from the SHP and CDC programs, was provided by CHPs after they received training in self-care program for arthritis patients. Rheumatoid arthritis patients were referred to community hospitals and osteoarthritis patients in rural areas were managed by CHPs. Therefore, only osteoarthritis (hereafter referred to as 'arthritis') patients were included in this study.

Since Rosenbaum and Rubin (1983) developed the concept of propensity scores estimated at baseline to control for selection bias in cohort studies, the propensity score matching (PSM) analysis has been used to control for confounding variables in various studies (Ahmed et al., 2006; Lee et al., 2007). PSM can be usually used when baseline demographics and other covariates between experimental and control groups are imbalanced. Propensity scores are generated through a logistic regression model, treating the intervention as the dependent variable and all confounding covariates as predictor variables (Qin, Titler, Shever, & Kim, 2008). Although the subjects were randomly assigned to an experimental or control group, there were several significantly different characteristics between the two groups in this study. PSM was a valuable tool to control for the differences between the two groups in this study.

This study was intended to evaluate a self-care program for elderly arthritis patients in rural areas, and especially those managed by CHPs in rural Korea, and had the following specific objectives: To measure health and arthritis-related characteristics of arthritis patients in rural areas;

and to measure the effectiveness of a self-care program for arthritis patients in rural areas.

## METHODS

### 1. Design

This study used a randomized controlled study design. Participants were randomly assigned to the experimental group or control group according to province unit to control for the diffusion of treatment among participants in geographically proximal areas. Four provinces were randomly assigned to two experimental provinces and two control provinces. Twenty-seven community health posts were included in the experimental group and 20 community health posts were in control group. The experimental group received the self-care program, while the control group received the 6 weeks SCP intervention after measuring the effectiveness of the intervention group.

### 2. Setting and sample

A total of 342 osteoarthritis patients from 47 community health posts agreed to participate in the study: 182 patients from 27 community health posts were placed in the experimental group and 160 patients from 20 community health posts were placed in the control group. Thirty-two patients in the experimental group and 20 patients in the control group dropped out during the study because of farm work, refusal to participate in the middle of the program and partially completed questionnaire. Finally, 150 arthritis patients in the experimental group and 140 arthritis patients in the control group were included in the analysis. One CHP took care of average 6 to 7 arthritis patients at the community health post.

Sixty-four participants were needed in each group to detect a medium effect ( $d = .5$ ) in our primary outcomes with a power of .80 and a two-tailed alpha of .05 (Cohen, 1988). The actual number of participants in this study was sufficient.

### 3. Procedure

The intervention study required several criteria: intervention protocols, the use of treatment manuals, training and certification of interventionists, and continuous monitoring of actual implementation (Burgio et al., 2001). In this study, the intervention protocols and treatment

manuals which were revised by CHPs who had worked in community health posts for more than 10 years after development of research team were applied. The CHPs working in community health posts were also trained in the protocols for two days and tested prior to implementation. They were educated at the same time in the training place of Gongju-city with corporation of local governments and regional public health centers 1 month before intervention. And the study team monitored progress continuously until the end of the program.

After the pre-test, participants in the experimental group received the self-care program. After the program, the post-test was conducted with all participants. The participants in the control group received the intervention after completion of the study, to resolve the ethical problems associated with being in the control group. Data collection and intervention were conducted from June to August, 2008.

### 4. Measurements

Data were collected on the following criteria: demographic characteristics, health-related characteristics, disease-related characteristics, the number of painful joints, and the level of arthritis management skill.

Demographic data were related to age, gender, education level, marital status, religious affiliation, and economic status. The health-related data were related to perceived health status, systolic blood pressure, fasting blood sugar levels, and body mass index, and disease-related data covered the diagnosis period, family history, drug use, operation history, admission history, and previous education about arthritis.

To measure the effectiveness of the intervention program, differences in the number of painful joints and the level of arthritis management skill were checked. The number of painful joints was measured by checking all painful joints using an image showing possible joints. The level of arthritis management skill was measured by a scale developed by the study team. The scale has a total of 20 questions and uses a 5-point Likert scale. It consisted of seven sub-components physical activities, medication, pain management without medication, weight control, nutrition, stress management, and health check-up. In this study, Cronbach's alpha coefficient for the scale was .89.

### 5. Self-care program

The aim of the self-care program was to improve the level of arthritis management skill and decrease discomfort signs and symptoms. The

Self-care Program (SCP) of this study was a revised version of the SHP by the Korean Rheumatology Health Professional Society and the U.S. CDC program. The SCP for this study consisted of 7 main areas, including understating of osteoarthritis, physical activities, pain management using drugs, pain management by non-drug methods, weight control, nutrition, and stress management. The contents were revised by literature review and consultation of the CHPs, and were developed easily considering that most participants were elderly. The program was scheduled once a week for six weeks. The actual duration of each session was 2 hours. Group education and physical activities were performed during each session. The physical activities performed included stretching, muscle strengthening exercises, and aerobic exercise (Table 1).

### 6. Data analysis

Descriptive statistics were used to evaluate the demographic, health-related, and osteoarthritis-related characteristics of the participants. Independent-sample t-tests, ANOVA with post-hoc comparisons (Tukey test), and Pearson correlations were used to compare the dependent variables according to the subjects' characteristics and homogeneity between the two groups. Propensity score was used to control imbalanced variables between experimental and control groups because baseline demographic characteristics of two groups were not homogeneous. Propensity score was calculated through gender, age, education, marital status, economic status, perceived health status, systolic blood pressure, fasting blood sugar level, family history, medication, and previous education about osteoarthritis. One-to-one nearest neighbor matching method which was selected control participant having most approximate propensity score with each participant in experimental group was applied. After controlling for possible confounding variables using PSM, independent t-test was used to compare differences in the number of painful joints and the level of arthritis management skill between the two groups after controlling for possible confounding variables. For data analysis, Stata/SE 10.0 software was used.

## RESULTS

### 1. Baseline characteristics of participants

Table 2 presents the baseline characteristics of the participants. The average age was 65.70 ± 8.98 years with an age range from 51-82 years;

**Table 1.** Contents of the SCP

Weeks	Contents
1 <sup>st</sup>	1. Overview of arthritis 2. Everyday exercise for arthritis
2 <sup>nd</sup>	Pain control by medication 1. Pain management 2. Principle of medication use 3. Pain control medication use 4. Anti-inflammatory medication
3 <sup>rd</sup>	Pain control by other methods 1. Cold massage 2. Hot massage 3. Joint massage 4. Knee joint massage 5. Hand joint massage 6. Other physical therapy 7. Environment support for pain control 8. Healthy life style for arthritis management
4 <sup>th</sup>	Obesity control 1. Definition of obesity 2. Effects of obesity on health 3. Causes of obesity 4. Obesity management: Healthy eating exercise
5 <sup>th</sup>	Dietary management 1. Principle of diet 2. Good diet for arthritis 3. Diet to avoid if arthritic 4. Supplementary diet for arthritis
6 <sup>th</sup>	Stress management 1. Relaxation therapy 2. Effective communication 3. Checklist for my communication skills 4. Checklist for my listening skills

SCP = Self-care program.

91.0% were female, and 68.5% were married. For educational background, 32.6% of participants had no education, while 63.4% had religious affiliations. For perceived health status, 49.3% responded that their health status was poor. The average systolic blood pressure (SBP) was 123.08 ± 15.11, and the average fasting blood sugar (FBS) level was 122.89 ± 29.02. The number of years since the onset of illness ranged from 4 months to 30 years with a mean of 6.38 ± 5.96 years. A family history was found in 27.9% of subjects, 86.2% were taking arthritis medication. For past history, 7.2% had an operation (OP) history and 10.0% had a hospital admission history. Only 15.5% of the participants had previously received osteoarthritis education.

A homogeneity test indicated significant between-group differences in age ( $t = 4.22, p < .001$ ), marital status ( $\chi^2 = 4.55, p = .033$ ), economic status ( $\chi^2 = 7.01, p = .008$ ), perceived health status ( $\chi^2 = 10.88, p = .004$ ), SBP ( $t = 4.63, p < .001$ ), FBS ( $t = 2.29, p = .023$ ), family history ( $\chi^2 = 16.70, p < .001$ ), medication ( $\chi^2 = 5.39, p = .020$ ), and previous education about

**Table 2.** Characteristics of Participants

Variables	Categories	Total (N=290)	Exp. (n=150)	Cont. (n=140)	$\chi^2$ or t	p
		n (%) or M $\pm$ SD	n (%) or M $\pm$ SD	n (%) or M $\pm$ SD		
Demographic characteristics						
Gender	Female	264 (91.0)	139 (92.7)	125 (89.3)	0.64	.423
	Male	26 (9.0)	11 (7.3)	15 (10.7)		
Age (year)		65.70 $\pm$ 8.98	63.61 $\pm$ 8.70	67.94 $\pm$ 8.76	4.22	<.001
Education	No formal education	93 (32.6)	46 (31.7)	47 (33.6)	0.47	.791
	Elementary school	134 (47.0)	71 (49.0)	63 (45.0)		
	$\geq$ Middle school	58 (20.4)	28 (19.3)	30 (21.4)		
Marital status	Married	198 (68.5)	111 (74.5)	87 (62.1)	4.55	.033
	Widowed	91 (31.5)	38 (25.5)	53 (37.9)		
Religion	Yes	184 (63.4)	102 (68.0)	82 (58.6)	2.38	.123
	No	106 (36.6)	48 (32.0)	58 (41.4)		
Economic status	High	101 (38.3)	66 (45.8)	35 (29.2)	7.01	.008
	Low	163 (61.7)	78 (54.2)	85 (70.8)		
Health-related characteristics						
Perceived health status	Poor	143 (49.3)	60 (40.0)	83 (59.3)	10.88	.004
	Moderate	113 (39.0)	70 (46.7)	43 (30.7)		
	Good	34 (11.7)	20 (13.3)	14 (10.0)		
Systolic blood pressure (mmHg)		123.08 $\pm$ 15.11	119.25 $\pm$ 13.76	127.19 $\pm$ 15.44	4.63	<.001
Fasting blood sugar level (mg/dL)		122.89 $\pm$ 29.02	119.15 $\pm$ 30.45	126.89 $\pm$ 26.94	2.29	.023
BMI (kg/m <sup>2</sup> )		24.49 $\pm$ 3.03	24.43 $\pm$ 3.35	24.54 $\pm$ 2.65	0.31	.761
Osteoarthritis-related characteristics						
Period of illness (year)		6.38 $\pm$ 5.96	6.83 $\pm$ 5.80	5.91 $\pm$ 6.12	2.32	.188
Family history	Yes	81 (27.9)	58 (38.7)	23 (16.4)	16.70	<.001
	No	209 (72.1)	92 (61.3)	117 (83.6)		
Medication	Yes	250 (86.2)	122 (81.3)	128 (91.4)	5.39	.020
	No	40 (13.8)	28 (18.7)	12 (8.6)		
OP history	Yes	21 (7.2)	12 (8.0)	9 (6.4)	0.15	.695
	No	269 (92.8)	138 (92.0)	131 (93.6)		
Admission history	Yes	29 (10.0)	16 (10.7)	13 (9.3)	0.04	.845
	No	261 (90.0)	134 (89.3)	127 (90.7)		
Previous education about osteoarthritis	Yes	45 (15.5)	32 (21.3)	13 (9.3)	7.13	.008
	No	245 (84.5)	118 (78.7)	127 (90.7)		

Exp. = Experimental group; Cont. = Control group; BMI = Body mass index; OP = Operation.

osteoarthritis ( $\chi^2 = 7.13, p = .008$ ).

## 2. The relationship between baseline characteristics and dependent variables

The baseline characteristics of the subjects affecting the number of painful joints were gender ( $t = -3.43, p = .001$ ), age ( $r = .15, p = .010$ ), marital status ( $t = -2.97, p = .003$ ), economic status ( $t = -4.12, p < .001$ ), and perceived health status ( $F = 3.06, p = .048$ ). The factors affecting the level of osteoarthritis management skill were education status ( $F = 10.89, p < .001$ ), marital status ( $t = 3.86, p < .001$ ), perceived health status ( $F = 4.93, p = .008$ ), SBP ( $r = -.19, p = .001$ ), family history ( $t = -3.26, p = .001$ ), and previous education about osteoarthritis ( $t = -2.60, p = .012$ ) (Table 3).

## 3. Changes in dependent variables before and after the program in the two groups

After the intervention, the experimental group had a significantly lower number of painful joints ( $t = 2.83, p = .005$ ) and greater improvement in the level of arthritis management skill ( $t = -2.42, p = .016$ ) compared to the control group (Table 3).

## 4. Propensity score matching analysis for factors related to differences between pre-test and post-test results

Table 4 presents differences in the dependent variables between pre-test and post-test among participants, after PSM. All variables affecting the dependent variables in Table 2 and Table 3 were used as covariates as

**Table 3.** The relationship between baseline characteristics and dependent variables

Variables	Categories	Number of painful joints			Level of osteoarthritis management skill		
		M ± SD	t or F or r	p	M ± SD	t or F or r	p
Gender	Female	4.04 ± 3.53	-3.43	.001	60.39 ± 14.71	1.68	.104
	Male	2.88 ± 1.31			66.62 ± 18.32		
Age (year)			.15	.010		-0.08	.170
Education	No formal education <sup>a</sup>	3.84 ± 3.25	0.33	.721	61.00 ± 14.90	10.89	< .001* (c > a,b)
	Elementary school <sup>b</sup>	3.90 ± 3.03			57.97 ± 13.09		
	≥ Middle school <sup>c</sup>	4.28 ± 4.47			68.69 ± 17.31		
Marital status	Married	4.31 ± 3.51	-2.97	.003	58.72 ± 14.44	3.86	< .001
	Bereavement	3.11 ± 3.05			66.08 ± 15.30		
Economic status	High	5.27 ± 4.34	-4.12	< .001	61.84 ± 18.17	-1.24	.217
	Low	3.29 ± 2.63			59.29 ± 12.53		
Perceived health status	Poor <sup>a</sup>	4.04 ± 3.41	3.06	.048* (c > a,b)	60.00 ± 13.64	4.93	.008* (c > a,b)
	Moderate <sup>b</sup>	3.46 ± 2.93			59.88 ± 16.19		
	Good <sup>c</sup>	5.06 ± 4.51			68.50 ± 15.78		
Systolic blood pressure			.02	.789		-0.19	.001
Fasting blood sugar level			-.05	.394		0.06	.277
Family history	Yes	3.69 ± 3.13	-0.76	.450	56.52 ± 14.07	-3.26	.001
	No	4.03 ± 3.51			62.67 ± 15.21		
Medication	Yes	4.04 ± 3.48	1.27	.205	61.32 ± 14.89	0.96	.343
	No	3.30 ± 2.84			58.65 ± 16.58		
Previous education about osteoarthritis	Yes	3.40 ± 4.08	1.15	.253	66.64 ± 16.22	-2.60	.012
	No	4.03 ± 3.27			59.90 ± 14.72		
Experimental group	Post-Pre	1.22 ± 2.65	2.83	.005	9.87 ± 11.67	-2.42	.016
Control group	Post-Pre	0.39 ± 2.21			6.16 ± 14.20		

\*Tukey test.

follows: gender, age, education, marital status, economic status, perceived health status, SBP, FBS, family history, medication, and previous education about osteoarthritis.

After PSM, significant differences on every covariate, except FBS level, between the experimental group and control group disappeared. After controlling the covariates, the experimental group showed significant improvement in the number of painful joints ( $t = -7.00, p < .001$ ) and the level of arthritis management skill ( $t = 2.28, p = .024$ ) compared to the control group.

## DISCUSSION

The SCP was implemented by the CHP for arthritis patients in rural areas in the community health post, which is the health clinic run by the CHP. The CHP was started in 1980 per the recommendation of WHO's 1978 meeting at Alma-Ata (WHO, 1978). WHO set a goal of 'Health for All by the Year 2000 in 1978 and recommended primary health care to achieve that goal. Korea developed the CHP as a national primary health care strategy in rural areas. According to Park (2010), the community

had higher satisfaction with CHPs compared to other health care providers in rural areas. People older than 65 years old receive health services and pay only a small fee for medication. The medication fee is free for elderly patients of CHPs compared to 23,914 won per 1 patient per month from community hospitals by medical doctors (Moon, 2007). The National Health Insurance Cooperation (NHIC) reimburses the health care fee to health institutions for patient care. The reimbursement fee to CHPs from NHIC is about one third compared to community hospitals. CHPs contribute in two ways. One is that CHPs contribute to increased health accessibility for rural populations, because the community health post is in a nearby community, within walking distance.

To increase the generalization of the study results, study participants should be recruited from various areas. However, former studies (Kim et al., 2003; Kim, 2004) were performed at the limited areas for their intervention. This study was implemented at three provinces including 47 community health posts. Therefore, the results of this study can be contributed for better generalization compared to the former studies.

Since the SCP was provided by the CHPs at their community health post, this study provided two days of training for the CHPs before the

**Table 4.** PSM Analysis for Factors related to the Differences between Pretest and Posttest

Variables	Number of painful joints				Level of osteoarthritis management skill			
	Exp. (mean/%)	Cont. (mean/%)	$\chi^2$ or t	<i>p</i>	Exp. (mean/%)	Cont. (mean/%)	$\chi^2$ or t	<i>p</i>
Dependent variable	-2.04	-0.37	-7.00	<.001	10.03	6.69	2.28	.024
Gender (female)	92.1	86.4	0.78	.376	92.1	92.0	0.001	.961
Age (year)	65.44	63.66	1.62	.106	63.69	64.66	-0.90	.371
Education (no formal education)	32.4	31.8	0.003	.959	32.8	36.0	0.09	.691
Marital status (married)	75.5	68.2	0.54	.462	75.7	60.0	2.68	.128
Economic status (high)	44.6	36.4	0.52	.469	45.0	24.0	3.84	.060
Perceived health status (poor)	38.8	54.5	1.93	.164	39.3	52.0	1.42	.298
Systolic blood pressure	120.51	118.54	1.16	.247	118.59	119.55	-0.55	.583
Fasting blood sugar level	125.44	117.85	2.38	.018	117.96	120.11	-0.73	.468
Family history (yes)	38.1	18.2	3.30	.069	37.9	20.1	2.97	.104
Medication (yes)	82.7	90.9	0.94	.333	82.9	84.0	0.02	.891
Previous education about osteoarthritis (yes)	22.3	13.6	0.86	.355	22.1	16.0	0.48	.496

Exp. = Experimental group; Cont. = Control group; PSM = propensity score matching.

intervention. The content of the CHPs' training program were arthritis assessment, ROM measurement, group education strategies, the contents of the SCP, and data collection methods. In most of the studies, researchers provided the intervention (Lee et al., 2002; Lee et al., 2001). Therefore, there was a lack of continuity of services after the study. However, in this study, CHPs were trained as providers of the intervention, and they can follow-up continuously with arthritis patients in the community. These were the advantages of utilizing health care providers in the study for both community members and health care providers.

Many studies have reported significant outcomes after 6 weeks of an arthritis self-care program. Osborne et al. (2007) reported the results of their 6 weeks Arthritis Self-care Management for 452 arthritis patients. Although the absolute changes in health status were small, pain, fatigue, health distress, and self-efficacy showed significant improvement. Yip et al. (2007) also reported on their 16-week self-management arthritis program for 67 experimental subjects and 53 controls. There were significant improvements in arthritis self-efficacy, most self-management skills, and pain. Goepfinger, Armstrong, Schwartz, Ensley, and Brady (2007) compared the effectiveness of a 6-week arthritis self-help course (ASHC) for 26 arthritis patients and a Chronic Disease Self-Management Program (CDSMP) for 22 arthritis patients. The ASHC participants showed significant improvement in self-efficacy, stretching, and general health, but not in pain.

There are problems with some of the previous studies. First, some of the studies include only an experimental group and compare pre-post

changes in that group (Lee et al., 2002; Osborne et al., 2007). As a result, we cannot control for changes due to natural improvements with time. Second, some of the studies included too small a sample size to measure the effect of the intervention (Kim et al., 2003; Lee et al., 2001). Since 64 study subjects were needed for a moderate effect, .05 significance level, and .8 study power, no significant differences in those studies could be due to low study power from a small study population.

Most previous intervention periods were 6 weeks. Since arthritis is the chronic health problem, arthritis patients should maintain the self-care ability even after 6 weeks of intervention. One study followed up with the study participants 1 year after the intervention: Arthritis self-care ability had decreased compared to the outcome right after the intervention (Goepfinger et al., 2007). Future studies are needed to find effective strategies to maintain life-long self-care ability for arthritis patients after the intervention.

The assignment of study participants was generally performed based on the individual. This study, however, was concerned the diffusion of treatment because of frequent contacts among participants if participants managed by one CHP were divided into experimental and control group. Therefore, in order to prevent the diffusion of treatment, four provinces were randomized into 2 experimental and 2 control groups in this study; however, several characteristics of the two groups were significantly different. In this study, PSM was used to control for the confounding variables. In many studies, multivariate regression analysis (MRA) has been used to control for confounding variables, which can

affect to the outcome of studies. However, PSM is recognized as better than MRA for controlling confounding variables. Lee et al. (2007) reported that MRA might have less reliability compared to PSM due to its linear relationship assumption between dependent variables and independent variables. Also, frequently making dummy variables for MRA causes problems in measuring the effectiveness of the intervention. Rubin and Thomas (2000) also recommended PSM to reduce the probability of measurement errors by matching. However, there have been not many studies using PSM in the field of nursing in Korea.

Even though this study applied PSM analysis to control for the confounding variables, there may be limitations in interpretation of results because baseline demographics between two groups were not homogeneous. Therefore, future study is required to select and assign study participants carefully.

In conclusion, a 6-week SCP for arthritis managed by primary health care workers (CHP at community health post) was effective at reducing pain and increasing the self-care ability. However, since arthritis is a chronic health problem, future studies to develop strategies to maintain the life-long self-care ability of arthritis patients are needed.

## CONCLUSION

This study was intended to evaluate a self-care program for elderly arthritis patients, and especially those managed by CHPs in rural area of Korea. As CHPs are taking care of the health problems of the community people, this type of program is an efficient way to provide intervention by CHPs. Two days training of CHPs was provided ahead of the intervention. The training for CHPs was useful to increase capacity for CHPs. Total 290 participants from four provinces were randomized into experimental and control groups. Even after controlling the possible confounding variables by PSM, 6-week self-care program for arthritis managed by CHPs showed effectiveness at reducing arthritis-attributable pain and increasing the self-care ability. Based on the findings of this study, evaluation of long-term effects of self-care program is recommended to develop strategies to maintain the life-long self-care ability of arthritis patients in future studies.

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