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The Effects of Self-Efficacy Promoting Cardiac Rehabilitation Program on Self-Efficacy, Health Behavior, and Quality of Life

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Background. Ischemic heart disease results from athesclerotic changes of the coronary artery. These changes are aggravated by hypercholesterolemia, smoking, obesity, lack of exercise, coronary-prone personality, and stress. Because these risk factors affect not only the prevalence of the ischemic heart disease but also recurrence of the disease, cardiac rehabilitation programs were introduced to help patients with ischemic heart disease reduce risk factors. Diverse cardiac rehabilitation programs are needed to motivate participation in cardiac rehabilitation and to enhance patients' quality of life.

Objectives. To examine the effect of a self-efficacy promoting cardiac rehabiltation program on self-efficacy, health behavior and quality of life of patients with ischemic heart disease.

Methods. Data were collected from 45 hospitalized ischemic heart disease patients. Medical records were reviewed to obtain demographic and clinical characteristics. Data regarding self-efficacy, health behavior, and quality of life were obtained from interviews using structured questionnaires. The nonequivalent control group non-synchronized design was used to conduct this study. One session of conventional group education was given to patients in the control group while they were in the hospital. Patients in the experimental group participated in a newly developed cardiac rehabilitation program. It focused on strengthening self-efficacy with four self-efficacy sources - performance accomplishment, vicarious experiences, verbal persuasion and physical status using two individualized in-hospital education sessions and four weekly telephone counseling follow-up calls after discharge.

Results. Four weeks after discharge, the increment of total self-efficacy score was significantly higher in the experimental group than in the control group ($p<.01$). There was also a significant difference in the total quality of life scores increments between the two groups ($p<.01$). However, no significant changes were noted in the increments of total health behavior scores between the two groups.

Conclusion. A cardiac rehabilitation program focusing on promoting self-efficacy was effective in improving self-efficacy, and quality of life of patients with ischemic heart disease.

Key Words: ischemic heart disease, self-efficacy, health behavior, quality of life, cardiac rehabilitation

INTRODUCTION

The purpose of the study was to examine the effect of a self-efficacy promoting cardiac rehabilitation program on self-efficacy, health behavior, and quality of life of patients with ischemic heart disease.

Ischemic heart disease is a disease that results in inadequate blood supply to, or necrosis of the myocardium because of atherosclerotic changes of the coronary

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artery (Kinney, Packer, & Dunbar, 1988). Its manifestations differ according to the type of vessel involved and the site and the extent of the disease within the vessels (Flapan, 1994).

Well-established major risk factors for ischemic heart disease include hypertension, hypercholesterolemia, smoking, diabetes mellitus, obesity, sedentary lifestyle and an aggressive response to stress (Baxendale, 1992). These risk factors are known to affect not only prevalence of ischemic heart disease but also recurrence of the disease (Cornett & Watson, 1984). Cardiac rehabilitation programs were introduced to improve quality of life for patients with ischemic heart disease by eliminating physical and psychological barriers that may impede recovery (King & Teo, 1998). Cardiac rehabilitation programs have advanced over the last three decades. Modern concepts of the cardiac rehabilitation now emphasize risk stratification to individualize patient management, early progressive exercise programs and education and counseling about psychological and vocational aspects of recovery (Oldridge, Guyatt, Fischer, & Rimm, 1988; McGirr, Rukholm, Salmoni, O'Sullivan, & Koren, 1990; Pearson & Fuster, 1996). Although theoretical concepts of the rehabilitation were advanced, researchers have demonstrated that the number of available programs remains insufficient to meet the needs of patients, the participation rate of the existing programs is relatively low (Bittner, Sanderson, Tayler, & Green, 1997; Gordon & Haskell, 1997; Franklin, Hall, & Timmis, 1997) and existing programs were still focusing primarily on physical training (Gordon & Haskell, 1997). Future rehabilitation lies in developing new methods for expansion of services to all patients needing such services, increasing clinician referral of patients to programs and patient compliance with the program once referred (Gordon & Haskell, 1997).

In Korea, cardiac rehabilitation was introduced in the 1990s when the increased prevalence of ischemic heart disease was recognized (Hong, 1996). Several investigators showed the positive effects of cardiac rehabilitation (Choo, 1997; Han, 1998; Shin, 1999; Cho, 1999), but it has not been widely used as of yet.

Bandura's (1986) self-efficacy theory is recognized as a framework for nursing intervention for chronically ill patients. By improving the level of self-efficacy, patients could improve their self care activities and health behaviors (McAuley, 1992; Perkins & Jenkins, 1998; Oldridge & Rogowski, 1990; Gillis et al., 1993).

In Korea, nursing interventions to improve health behavior by fostering self-efficacy were first tried in patients with hypertension (Park, 1994; Lee, 1994), hemodialysis (Song, 1999), coronary heart disease (Shin, 1999), rheumatoid arthritis (Kim, 1994), and cancer (Oh, 1994). However, there still have not been enough studies to allow evaluation of the self-efficacy model to improve health behavior and quality of life of patients with ischemic heart disease.

It is important to develop a self-efficacy promoting cardiac rehabilitation program and to examine whether improvement in self-efficacy can lead to the improvement in health behavior and perceived quality of life. Through this approach, the usefulness of Bandura's self-efficacy model can be identified and further development of nursing practice can proceed.

METHODS

Research Design

The study was conducted using a non-equivalent control group non-synchronized design. Patients in the control group were recruited first and after completing data collection in the control group, recruitment and data collection in the experimental group was done.

Subjects

Patients were enrolled from the coronary care unit between May and October of 2000. Inclusion criteria were: (1) diagnosis of acute myocardial infarction or unstable angina (2) free of severe arrhythmias or heart failure (3) free of non-cardiac serious comorbidities; and (4) under medical treatment without surgical interventions.

The sample size was determined using Cohen's equation (Cohen, 1988). Of 50 patients who were enrolled at the beginning, five patients could not complete the study and therefore were excluded, yielding 23 for the control group and 22 for the experimental group.

Program development

The booklet named Healthy Heart Healthy Life was printed with large letters and colorful drawings for elderly patients. It contained information regarding the causes of ischemic heart disease, desirable food habits, regular exercise, stress management, and quitting smoking. It also identified current lipid intake, confidence in quitting smoking and distance walked everyday.

The cardiac rehabilitation program consisted of two

parts, an in-hospital program and an after-discharge program. These focused on promotion of individual self-efficacy through use of self-efficacy sources: verbal persuasion, vicarious experience, performance accomplishment, and physiological status. The in-hospital program included risk stratification (verbal persuasion), use of an exercise and activity diary and heart rate check (performance accomplishment), encouragement of abdominal breathing for relaxation before education (physiological status), booklet review (verbal persuasion, vicarious experience), encouragement of smoking cessation during hospitalization (performance accomplishment), exercise demonstration and practice (performance accomplishment), medication review with actual drug demonstration(verbal persuasion), and individual consultation with a dietitian (verbal persuasion and vicarious experience). The in-hospital program was divided into two sessions and each session lasted about 50 minutes. Charge nurse of the CCU participated in the education sessions.

The after-discharge program was made up of four weekly telephone counseling. During the counseling, home care during the last week was reviewed, success was praised and subsequent goals were set. Each telephone counseling session averaged about ten minutes.

Procedure

While patients were hospitalized, demographic and clinical characteristics were obtained from medical records review. Demographic characteristics included age, gender, educational background, employment status, economic status, and marital status. Clinical characteristics included diagnosis, degree of chest pain that caused the patient to be admitted, physiologic risk factor score, Body Mass Index (BMI), smoking habit, exercise habit and diet. An interview was performed with questionnaires regarding self-efficacy, health behavior and perceived quality of life while patients were hospitalized. Four weeks after discharge, patients visited the outpatient clinic and an interview was performed to obtain information regarding self-efficacy, health behavior, and quality of life (QOL) once again.

Conventional program versus new program

The conventional group program including lectures from a doctor, a nurse, and a dietitian that were given to the control group with one session of group education while the patients were hospitalized. The session was held once a week at the conference room near ward. After lectures, questions and answers were provided. The session lasted about one and a half hour. The experimental group received the newly developed cardiac rehabilitation program. It consisted of two individualized education sessions during hospitalization and four weekly telephone counseling sessions after discharge. In-hospital individualized education sessions were provided at the CCU or patient's room with booklet by researcher or charge nurse of the CCU.

Instruments

Physiologic risk factor scores were calculated according to the Frammingham Heart Study Global Risk Assessment (Grundy et al., 1999) including age, total cholesterol level, HDL cholesterol level, systolic blood pressure, blood sugar level and smoking status. High score indicated high risk of ischemic heart disease.

Self-efficacy was measured with the Self Efficacy Questionnaire, which was modified from Becker and Levine's (1987) 'Life style Assessment Tool for patients with Hypercholesterolemia'. It has four subscales and each subscale has five items on a 5-point rating scale. The sum of subscale self-efficacy scores means total self-efficacy score ranging from 20 to 100. Higher scores indicate high levels of self-efficacy. Cronbach's alphas were .80 in-hospital and .85 after-discharge.

Health behavior was recorded using the Health Behavior Questionnaire. It was modified from Han's (1998). It has five subscales and 30 items in total on a 5-point rating scale. The total health behavior score ranged from 30 to 150. Higher score means higher level of health behavior performance. The Cronbach's alpha were .85 in-hospital and .75 after-discharge.

Quality of life was measured using the Health Related QOL tool (Shinn et at., 1999). It consists of ten subscales and 28 items. The score of total quality of life ranged from 28 to 140. The Cronbach's alpha were .89 in-hospital and .92 after-discharge.

Data analysis

Data was analyzed using SPSSWIN 9.0 program. To describe demographic and clinical characteristics, descriptive statistics were used. Chi-square test and t-test were conducted to identify the homogeneity of the control and experimental group. To examine the effect of the newly developed program, t-test was conducted. Cronbach's alpha was used to verify the reliability and internal consistency of the instruments.

RESULTS

Demographic characteristics

In the experimental group, 12 (55%) were male, the mean age was 60 years and 17 (77%) were living with their spouses. In the control group, 11 (48%) were male, the mean age was 64 years, and 20 (87%) were living with their spouses. There were no statistically significant differences between the control group and experimental group in reference to age, gender, educational background, employment status, economic status and marital status.

Clinical characteristics

The length of stay was 6.10 days in the experimental group and 6.13 days in the control group. The degree of the chest pain (worst 10) was 6.23 in the experimental group and 6.09 in the control group. There were no significant differences between the experimental group and control group in diagnosis, length of stay, degree of chest pain, physiologic risk factor score, BMI, smoking habit,

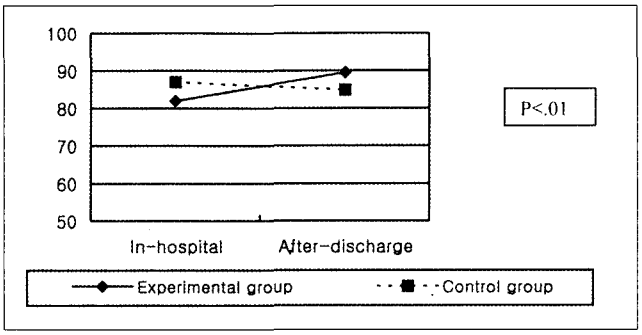

Figure 1. In the experimental group, the total self-efficacy score increased from 82.0 to 89.6 four weeks after discharge compared to the score of in-hospital. But in the control group, the total self-efficacy score decreased from 87.5 to 84.9.

Table 1. Demographic characteristics

Characteristics		Experimental Group N=22	Control Group N=23	x^2 or t value	p
Gender	Male	12 (55%)	11 (48%)	$x^2=0.768$	.440
	Female	10 (45%)	12 (52%)		
Age	Mean±SD	60.09±12.99	64.35±6.49	t =-1.399	.169
Education	Below junior high school	7 (32%)	11 (48%)	$x^2=0.365$	.215
	Above senior high school	15 (68%)	12 (52%)		
Employed	Yes	9 (41%)	10 (43%)	$x^2=1.000$	.551
	No	13 (59%)	13 (57%)		
Economic status	Above middle	18 (82%)	15 (65%)	$x^2=0.314$	.179
	Below middle	4 (18%)	8 (35%)		
With spouse	Yes	17 (77%)	20 (87%)	$x^2=0.459$	.324
	No	5 (23%)	3 (13%)		

Table 2. Clinical characteristics

Characteristics		Experimental Group N=22	Control Group N=23	x^2 or t value	p
Length of stay	Mean±SD	6.00±3.02	6.13±2.94	t =-0.147	.884
Degree of pain	Mean±SD	6.23±2.78	6.09±2.78	t =0.199	.843
Physiologic risk factor score	Mean±SD	9.05±5.92	12.05±9.84	t =-1.207	.232
BMI	Mean±SD	23.80±3.59	24.81±2.32	t =-1.129	.265
Smoking habit	Never smoke	12 (54%)	13 (52%)	$x^2=0.018$	.991
	Quit smoking	3 (14%)	3 (13%)		
	Smoke now	7 (32%)	7 (30%)		
Exercise habit	No regular exercise	16 (73%)	15 (65%)	$x^2=0.296$	.586
	Regular Exercise	6 (27%)	8 (35%)		
Food habit(fat)	Much intake	13 (59%)	15 (65%)	$x^2=0.180$	.672
	Less intake	9 (41%)	8 (35%)		
Diagnosis	AMI	8 (36%)	7 (30%)	$x^2=0.758$	.458
	Unstable Angina	14 (64%)	16 (70%)		

exercise habit and diet.

To determine whether self-efficacy, health behavior and quality of life were similar at baseline between the experimental group and control group, t-tests were performed and there were no significant differences between the two groups.

Effects on self-efficacy

The total self-efficacy score of the experimental group and the control group four weeks after discharge was 89.59 and 84.86 respectively. There was a 7.59 point increase from in-hospital to four weeks after discharge in the experimental group, but in the control group, there was 2.62 point decrease. This change was statistically significant (t=2.892, p=.003). Looking into subscales, there were statistically significant increases in the subscale scores of exercise and activity self-efficacy and quitting smoking self-efficacy but there were no significant changes in medication self-efficacy and diet self-efficacy.

Effects on health behavior

The total health behavior score of the experimental group was higher than the control group four weeks after discharge, but this difference was not statistically sig-

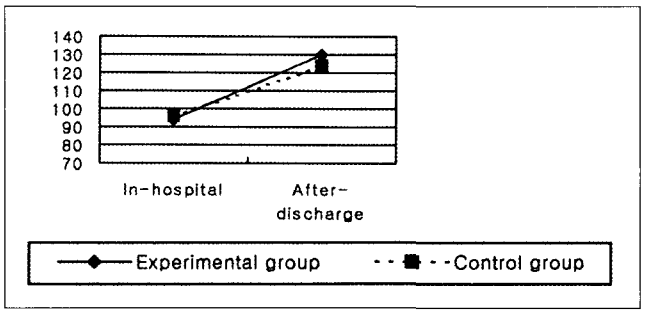

Figure 2. In the experimental group, the total health behavior score increased from 94.3 to 129.9 four weeks after discharge compared to the score of in-hospital. There was also high increment from 95.6 to 123.6 in the control group.

Table 3. Effects on Self-efficacy

	Group	Score In-hopsital (mean±SD)	Score 4 week after discharge (mean±SD)	Difference (mean±SD)	T	p
Medication	Experimental (N=22)	23.55±1.84	24.14±1.52	0.59±2.54	0.091	.464
Self-efficacy	Control (N=23)	24.00±2.73	24.52±0.73	0.52±2.56		
Diet	Experimental (N=22)	20.32±4.60	22.55±2.59	2.23±3.71	0.986	.165
Self-efficacy	Control (N=23)	22.04±3.69	23.09±2.89	1.04±4.30		
Exercise & activity	Experimental (N=22)	15.95±5.52	18.86±4.55	2.91±4.74	3.394	.000
Self-efficacy	Control (N=23)	18.26±5.90	15.26±5.99	-3.00±6.72		
Quitting smoking	Experimental (N=22)	22.18±5.79	24.05±3.53	1.86±3.87	1.982	.027
Self-efficacy	Control (N=23)	23.17±5.19	21.52±7.29	-1.65±7.41		
Total self-efficacy score	Experimental (N=22)	82.00±10.61	89.59±9.49	7.59±8.22	2.892	.003
	Control (N=23)	87.48±9.76	84.86±10.55	-2.61±14.45		

Table 4. Effects on Health behavior

	Group	Score In-hopsital (mean±SD)	Score 4 week after discharge (mean±SD)	Difference (mean±SD)	T	p
Medication	Experimental(N=22)	11.77±3.38	16.36±2.05	4.59±3.40	0.091	.044
Health behavior	Control(N=23)	13.39±2.98	16.22±1.35	2.83±3.37		
Diet	Experimental(N=22)	43.50±9.88	61.23±4.63	17.73±9.36	-0.646	.261
Health behavior	Control(N=23)	39.65±10.03	59.30±4.95	19.65±10.57		
Exercise & activity	Experimental(N=22)	22.14±5.83	32.68±4.36	10.55±7.40	2.840	.004
Health Behavior	Control(N=23)	25.17±7.77	29.09±6.66	3.91±8.22		
Quitting smoking	Experimental(N=22)	3.59±1.92	4.45±1.14	0.86±1.42	1.294	.102
Health Behavior	Control(N=23)	3.83±1.83	3.96±1.79	0.13±2.26		
Follow up	Experimental(N=22)	13.27±3.44	15.18±2.59	1.91±3.91	0.341	.368
Health behavior	Control(N=23)	13.57±4.02	15.04±3.47	1.48±4.53		
Total Health behavior Score	Experimental(N=22)	94.27±20.22	129.91±10.66	35.63±20.95	1.253	.159
	Control(N=23)	95.61±17.67	123.61±11.14	28.00±19.92		

nificant (t=1.253, p=.159). Among health behavior subscales, there were no significant differences in diet health behavior, quitting smoking health behavior, and follow-up health behavior subscales. By contrast, in the medication health behavior and exercise and activity health behavior subscales, there was a significantly higher increase in health behavior scores in the experimental group than in the control group (t=1.748, p=.044, t=2.840, p=.004 respectively).

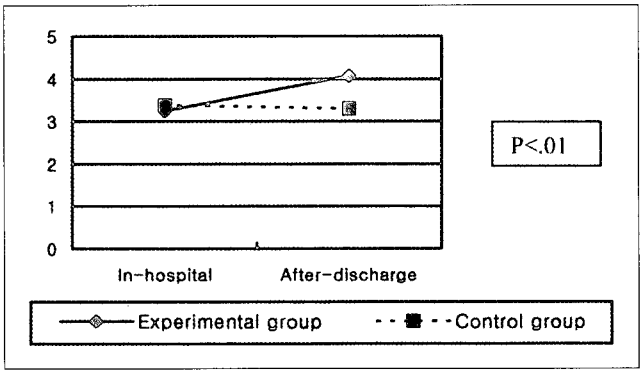

Figure 3. In the experimental group, the total quality of life score increased from 3.3 to 4.1 four weeks after discharge compared to the score of in-hospital. But in the control group, the total quality of life score decreased from 3.4 to 3.3.

Effects on quality of life

The increment of total quality of life score in the experimental group four weeks after discharge was higher than in control group significantly (t=3.030, p=.002). In several subscales such as perception of present health status, bodily pain, emotional functioning, social functioning, role limitation, there were statistically significant improvements four weeks after discharge in the experimental group. But in other subscales such as change of health status, vitality, satisfaction on health status and physical functioning, there were no significant changes.

DISCUSSION

Effects on self-efficacy, health behavior and quality of life

The significantly higher increases in total self-efficacy score in the experimental group compared to the control group, supported the suggestion that the Bandura's self-efficacy theory would be a useful framework for cardiac rehabilitation for patients with ischemic heart disease. Additionally those findings corresponded well with the results of Oldridge and Rogowski(1990), Gulanick (1991), Gortner and Jenkins(1990), Gillis(1993), and Shin(1999). Among self-efficacy subscales, there were

Table 5. Effects on Quality of life

	Group	Score In-hopsital (mean±SD)	Score 4 week after discharge (mean±SD)	Difference (mean±SD)	T	p
Perception of present health status	Experimental (N=22)	2.36±0.79	3.77±0.69	1.41±0.73	2.236	.014
	Control (N=23)	2.13±1.09	2.78±0.95	0.65±1.37		
Change of health status	Experimental (N=22)	2.36±1.05	4.22±0.69	1.86±1.21	1.520	.068
	Control (N=23)	2.09±1.12	3.39±0.78	1.30±1.26		
Vitality	Experimental (N=22)	2.31±1.04	3.30±1.02	0.68±1.25	0.786	.218
	Control (N=23)	2.30±1.43	2.67±1.90	0.30±1.89		
Bodily pain	Experimental (N=22)	5.86±3.25	8.95±1.68	3.09±3.49	2.117	.020
	Control (N=23)	6.69±3.21	7.48±3.38	0.78±3.80		
Satisfaction on health status	Experimental (N=22)	2.81±1.09	3.77±0.87	0.95±1.21	1.087	.142
	Control (N=23)	2.22±1.24	2.74±1.21	0.52±1.44		
Physical functioning	Experimental (N=22)	3.22±0.92	3.80±0.58	0.59±0.71	1.278	.104
	Control (N=23)	3.03±1.02	3.19±1.23	0.16±1.41		
Emotional functioning	Experimental (N=22)	3.01±0.81	4.23±0.55	1.21±0.78	2.407	.010
	Control (N=23)	3.12±1.21	3.36±1.34	0.24±1.73		
Social functioning	Experimental (N=22)	3.54±0.81	4.20±0.68	0.66±0.92	3.518	.000
	Control (N=23)	4.01±0.79	3.37±1.11	-0.64±1.49		
Role limitation	Experimental (N=22)	3.06±0.72	3.87±0.22	0.80±0.69	4.899	.000
	Control (N=23)	3.23±0.89	2.65±1.06	-0.78±1.34		
Overall health (Physical+emotional+social functioning) = total QOL score	Experimental (N=22)	3.25±0.63	4.08±0.41	0.82(0.56	3.030	.002
	Control (N=23)	3.39±0.79	3.31±0.97	-0.08(1.28		

significant increases in exercise and activity self-efficacy along with quitting smoking self-efficacy. Taking into account the fact that performance accomplishments were mobilized for fostering exercise and activity self-efficacy and quitting smoking self-efficacy, performance accomplishment was thought to be the most potent source among the four self-efficacy sources. The reason for failure to find a change in medication self-efficacy score was likely due to ceiling effect. In the case of diet self-efficacy, one could speculate that the general knowledge of the public has improved due to increased media attention tand that the group education of the control group had an impact on the diet self-efficacy.

Unlike total self-efficacy score, there was no significant increase in the total health behavior score in the experimental group. In diet, quitting smoking slong with follow-up health behavior subscales, there were no significant differences in the increments of the scores between the control and experimental group. These results can be explained by the following. First, the heart attack experience and admission itself could stimulate patients to comply with recommended health behaviors. Second, patients tended to answer positively regardless of their actual health behavior. But in medication, and exercise and activity health behavior, the increments of the scores of the experimental group were significantly higher than those of the control group. The explanation of the medication list with actual durgs seems to be effective to improve medication health behavior. The significant differences between the score of exercise and activity health behavior were accompanied by the significant increase of the score of exercise and activity self-efficacy. This result can be explained that self-efficacy improvement could lead to positive health behavior performance and be the predictor of the health behavior in the exercise and activity area. But in the case of quitting smoking category, although there were higher levels of self-efficacy score, there were no increments on health behavior score. It seemed that confidence in smoking cessation did not easily lead to smoking cessation. This result coincided with the study of Maeland and Havic (1987) but was contradictory to the results of Mills et al. (1985) and Ruzicki (1989).

The total quality of life score improved in the experimental group four weeks after discharge. But there were some subscales that did no cahnge such as health status, vitality, satisfaction with health status, and physical functioning. This finding may be due to the fact that study subjects had not fully recovered by thist ime point and were still in the recovery phase. Long term evaluation of quality of life is needed.

Rehabilitation program structure

Traditionally, education sessions have been focused on delivery of facts and booklets were written with black and white small letters. The book, (Healthy Heart, Healthy Life(used in this study had large letters and colorful drawings, which were helpful for elderly patients.

Most patients are anxious and have no idea what to do immediately after discharge. During this vulnerable period, patients usually are left alone. Thus, the after-discharge program would be a helpful method for patients to get supportive counseling and to set and follow realistic goals.

Limitations

The four weeks observation period was relatively short in terms of identifying long term effects of the program on self-efficacy, health behavior and quality of life. The study measured health behavior not by observation but by self-administered questionnaire and biases could affect the results.

CONCLUSION

This study was conducted using a nonequivalent control group, non synchronized design to examine the effects of the self-efficacy promoting cardiac rehabilitation program on self-efficacy, health behavior and quality of life of the patients with ischemic heart disease. Data was collected from medical records review, patient interviews and self administered questionnaires.

The results can be summarized as follows: the increments of the self-efficacy score of the experimental group were significantly higher four weeks after discharge than that of the control group. In subscales, while exercise and activity self-efficacy along with quitting smoking self-efficacy were increased significantly. There were no significant increases in the medication self-efficacy score and diet self-efficacy score in the experimental group.

There were increments of health behavior scores four weeks after discharge both in the control group and experimental group, but there were significant increases of score in the experimental group in the subscales of medication health behavior and exercise and activity health

behavior.

There was significant improvement shown in the quality of life of the experimental group four weeks after discharge.

This study showed that the Bandura's self-efficacy model could be a useful framework for the cardiac rehabilitation program and promoted the utilization of the nursing theory on clinical nursing practice.

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