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Effects of a Face-to-face Self-management Program on Knowledge, Self-care Practice and Kidney Function in Patients with Chronic Kidney Disease before the Renal Replacement Therapy

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Purpose: The purpose of this study was to examine the effects of a face-to-face self-management educational program on knowledge, self-care practice and kidney function in patients with chronic kidney disease (CKD) before kidney replacement therapy. **Methods:** This study employed a nonequivalent control group, non-synchronized design. Data were collected from 61 patients with CKD visiting an outpatient department of nephrology in a university hospital in Seoul, South Korea. The experimental group (n=31) took the pre-test, then after 3 weeks, face-to-face education and individualized consultation (1st intervention), after a week of self-practice, the 1st post-test, followed by re-enforcement education and consultation (2nd intervention), and 4 weeks later, the 2nd post-test. The control group (n=30) took the pre-test and post-tests at 4 and 8 weeks. **Results:** Scores for knowledge of CKD and self-care practice over time improved significantly in the experimental group compared to the control group. Kidney function did not improve significantly in the experimental group. **Conclusion:** Health care providers can identify various and individualized needs, and provide effective education and consultation through face to face self-management for patients with chronic irreversible illnesses. Nurses can coordinate for these program by designing and providing systematic and effective education.

Key words: Self-management; Education; Chronic renal insufficiency

INTRODUCTION

In these days, prevalence of chronic illnesses has increased due to an aging society and advances in medical technology. One of common chronic illnesses is chronic kidney disease (CKD), a medical condition in which the kidneys fail to adequately filter toxins and waste products from the blood (The Korean Society of Nephrology, 2006). Its frequency has increased by 37.1% for the last 5 years from 85,141 patients in 2006 to 116,762 patients in 2010 so has its medical cost of 47.1% from 895 million won to 1,321 million won (Health Insurance Review & Assessment Service, 2011). If the maintenance therapy fails, patients with CKD need to take the replacement therapy, such as dialysis or kidney transplant to survive (Kim et al., 2011).

Therefore, early detection and treatment of CKD are important due to its rapid progression to End-Stage Renal Disease (ESRD) requiring the renal replacement therapy (Ishani et al., 2006). Total 58,860 Korean patients took the renal replacement therapy in 2010, including 39,509 patients taking hemodialysis therapy, 7,309 patients taking peritoneal dialysis and 12,042 patients receiving kidney transplant (The Korean Society of Nephrology, 2010). However, symptoms are hardly detectable during

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the early stage of CKD and the disease proceeds rapidly resulting in uremia, dialysis or kidney transplant (Chae et al., 2002).

To delay the disease progress to get renal replacement therapy, disease management for CKD is important to maintain kidney function and prevent complications, such as anemia, hyperkalemia, metabolic acidosis, osteodystrophy and cardiovascular diseases (Lee, 2007). Although development of medical technology and health services enables extension of life expectancy and improvement of quality of life, most patients with CKD perceive their chronic disease very negatively and are pessimistic about their possibility of maintenance or improvement of their conditions leading to non-compliance (Bae, Park, Kim, & Bang, 2011). Therefore, disease management programs for patients with CKD need to focus on active participation in the program and positive changes of their attitudes. Moreover, health care providers should identify individual level of understanding of disease and level of commitment to treatment first, and provide individualized education and consultation for patients to have interests in their own diseases and to improve self-care abilities.

In America, Kidney Disease Outcomes Quality Initiative (KDOQI) was developed for patients as well as health care providers to understand CKD and guide appropriate treatments by each step (Szromba, Thies, & Ossman, 2002). In Korea, previous studies of CKD were conducted mostly in patients taking renal replacement therapy already with study variables as self-care practice and physiological indicators (Jang, Oh, & Jang, 2012; Park & Lee, 2010), knowledge and self-care practice (Kim & Kim, 2008; Lee et al., 2009) and etc. On the other hand, studies of patients before the renal replacement therapy were a few measuring disease related knowledge and educational needs (Kim & Choi, 2010), and psychological distress (Bae et al., 2011). In clinical fields, convenient and cost-effective educational programs, such as web-based education or pamphlets are popular for health care providers. However, patients with chronic illness may need more direct interactions with health care providers for individualized consultation considering their own various conditions, as well as indirect standardized programs provided by computers or booklets.

The purpose of this study was to examine the effects of a face-to-face self-management educational program in patients diagnosed as CKD before kidney replacement therapy on knowledge, self-care practice and kidney function. The specific hypotheses are as below.

1. CKD patients participating in the face-to-face self-management program will report higher level of knowledge about disease than those in the control group.

2. CKD patients participating in the face-to-face self-management program will report higher level of self-care practice than those in the control group.

3. CKD patients participating in the face-to-face self-management program will show improved physiological indicators of kidney function more than those in the control group.

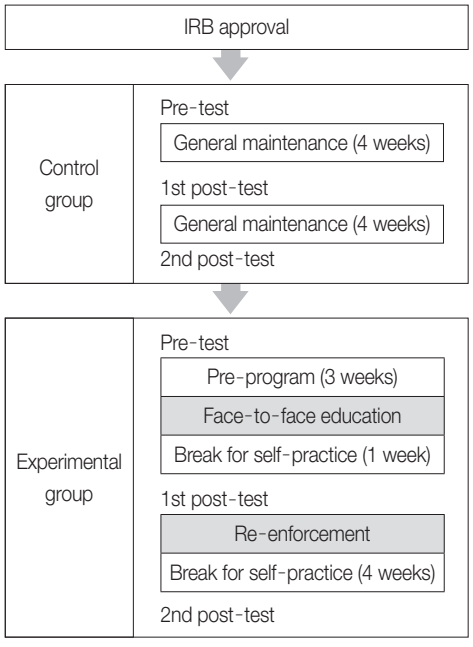
METHODS

1. Research design

This study employed a nonequivalent control group non-synchronized design to examine the effects of the face-to-face self-management program (Figure 1). Because patients with CKD were very sensitive about information provision, clinical experts recommended a non-synchronized design that the control group was completed first to prevent contamination of the experiment.

2. Study participants

Participants were patients with CKD and visiting an outpatient department of nephrology in a university hospital in Seoul, South Korea,



Pre-test: general characteristics, knowledge, self-care practice and physiological indicators; 1st post-test: knowledge and self-care practice; 2nd post-test: knowledge, self-care practice and physiological indicators.
IRB=Institutional review board.

Figure 1. Research process.

from May 23, 2011 to March 9, 2012 (control group = from May 2011 to August 2011; experimental group = from September 2011 to March 2012). Inclusion criteria were a) outpatients diagnosed as CKD, b) persons who hadn't started renal replacement therapy, c) patients aged 20 years old or over, and d) persons who understood the study process and were able to communicate.

The sample size was calculated using the G*Power 3.1.2 sample size calculation program (Faul, Erdfelder, Buchner, & Lang, 2009) as 61 persons total with an effect size of 0.30 based on previous studies (Reddy et al., 2009; Yen, Huang, & Teng, 2008) for Repeated Measures ANOVA of three-time measurement, $\alpha = .05$, and power of 80%. Total 61 patients (experimental group = 31 & control group = 30) participated in the study. There was no attrition or death during the study.

3. A face-to-face self-management program for chronic kidney disease

A face-to-face self-management program included a) small group face-to-face education and individualized consultation, and b) additional re-enforcement education and consultation to build up patients' self-management ability to delay their disease progression. Experts on CKD, including 5 physicians, 5 nurses and 3 nutritionists contributed to developing the program contents with our researchers as research advisors and to teaching patients as lecturers in this study through reviewing current clinical educational programs for patients with CKD (Table 1). Main topics of the face-to-face education were; a) understanding and self-managing CKD, b) diet management to delay the disease progression requiring the renal replacement therapy, and c) types of the renal replacement therapy. The understanding of CKD session included symptoms, progression, treatment and self-management of CKD. In this session a lecturer motivate participants to understand their own disease status and to be able to manage by themselves. The diet for CKD session included nutrients and electrolytes management. This session also identified tasks which participants could follow. The session of renal replacement therapy consisted of types and processes of replacement therapy. This session focused on importance of compliance of self-management practice to avoid renal replacement therapy.

As a teaching method, previous educational programs used mostly big classroom lectures, videos or pamphlets resulting in fewer opportunities of direct interactions with health care providers and their study subjects were patients under renal replacement therapy only (Jung, 2008). Therefore, this study program included pre-program session to identify individual characteristics, face-to-face education, individualized consultation time per each session for more dynamic interaction with health care providers, and re-enforcement education and consultation a week later. Educators were from the CKD expert panel who participated in the study process from the development of the program, including a physician, a nutritionist and a nurse for the 90-minute education using power point slides at a seminar room in hospital plus consultation time around 20 minutes for each patient. After one week, patients visited the outpatient department and took individual reinforcement education and consultation by a coordinating nurse researcher. Total of 8 groups (around 3 to 5 persons per group) attended the program in this study.

4. Research instruments

1) Knowledge of chronic kidney disease scale

The scale to measure patient's knowledge of CKD was polished by the CKD experts including 1 medical professor, 1 nursing professor and 1 hospital nutritionist from this study panel based on the 20-item CKD knowledge instrument developed by Song (1999) and modified by Kim and Kim (2008). The CKD expert panel rated the validity of each item and deleted 2 items scored less than 3 from 1 = inappropriate to 4 = very appropriate from the original. The deleted items were questions about normal range of potassium and constipation prevention. The contents of the final scale included normal kidney function, disease characteristics, diet, exercise, life style and dialysis. Right answer rated 1 and the range of total scores was from 0 to 10 with higher scores, indicating better level of knowledge about CKD. The Cronbach's alpha coefficient was .82 for the development study by Song and .88 by Kim and Kim. In this study, the Cronbach's alpha coefficient was .81.

2) Self-care practice scale for CKD patients

The self-care practice scale for CKD patients was developed by CKD experts from the study panel based on the self-care measurement tool for patients taking hemodialysis (Kim & Kim, 2008). The CKD experts including 1 medical professor, 1 nursing professor and 1 hospital nutritionist reviewed and modified the original 24-item scale. The panel rated validity of each item and deleted 4 items scored less than 3 from 1 = inappropriate to 4 = very appropriate. The deleted items were questions about participation in blood chemistry tests, such as potassium

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Table 1. Process of the Face-to-face Self-management Program

Process	Topic	Min	Contents	Methods	Lecturer	Precaution
Pre-program	Understanding clients		Review individual history Analyze lab results Identify current condition			Nurse coordinator informs lecturers
Face-to-face education	Introduction	5	Introduction of clients Importance of self-management Introduction of the program	Discussion	Nurse coordinator	
	Understanding of chronic kidney disease (CKD)	40	Structure and function of kidneys Definition of CKD Symptoms of CKD Process of CKD Treatment of CKD Self-management of CKD	PPT slides, face to face education	Physician	Focusing on tasks which clients are able to do
	Q & A	10	Individualized counseling	Consultation	Physician	
	Break	5	Break			
	Diet for CKD patients before the renal replacement therapy	30	Goals of CKD diet Protein management Sodium management Potassium management Phosphate management Cholesterol and lipid management Vitamins management	PPT slides, face to face education	Dietician	Focusing on tasks which clients are able to do
	Q & A	10	Individualized counseling	Consultation	Dietician	
	Renal replacement therapy	20	Definition of renal replacement therapy Types of renal replacement therapy Hemodialysis Peritoneal dialysis Kidney transplant	PPT slides, face to face education	Nurse	Focusing on importance of compliance of self-management to avoid renal replacement therapy
	Q & A	10	Individualized counseling	Consultation	Nurse	
	Closing	10	Distribute checklist client should follow	Face to face education	Nurse coordinator	
			One week break for self-practice			
Re-enforcement	Encouraging clients		Check compliance of self-management Identify issues in each client Counseling and re-education	Face to face consultation	Nurse coordinator	

Q&A = Question and answer.

and calcium. The instrument used 5-point Likert scale from 1 = never practice to 5 = always practice. Higher scores mean higher levels of self-care practice. The 6th, 11th and 20th item were negative statements and re-coded for analysis. The Cronbach's alpha coefficient was .89 by Kim and Kim. In this study the Cronbach's alpha coefficient was .88.

3) Physiological indicators of kidney function

(1) Blood Urea Nitrogen (BUN)/ Creatinine

BUN is an indication of renal health. Normal ranges 6 to 22 mg/dL. Serum creatinine is the most commonly used indicator of renal function. A rise in blood creatinine level is observed with marked damage to functioning nephrons. Normal ranges 0.8 to 1.2 mg/dL.

(2) Sodium/ Potassium (Na/ K)

Excretion of sodium and potassium decrease in CRF resulting edema and hyperkalemia. Normal ranges 135 to 145 mEq/L for sodium and 3.5 to 5.5 mEq/L for potassium.

(3) Calcium/ Phosphate (Ca/ P)

Lower function of kidney leads to decrease in excretion of phosphate or production of vitamin D causing hyperphosphatemia, hypocalcemia and renal osteodystrophy. Normal ranges 8.4 to 10.2 mg/dL for calcium and 2.5 to 5.6 mg/dL for phosphate. The 5 ml of blood sample was taken by plain tube and its result was checked using a centrifugal separator made by Hitachi Koki Corporation from the clinical laboratory in hospital.

(4) Hemoglobin (Hb)

Hb was checked to detect anemia, one of common complications of CRF due to decrease of erythropoietin and hematogenous functions. The 3 ml/dL of blood sample was taken by Ethylenediaminetetraacetic acid (EDTA) tubes. Normal ranges 12 to 16 g/dL.

(5) Glomerular Filtration Rate (GFR)

GFR describes the flow rate of filtered fluid through the kidney. The score was calculated by Modification of Diet in Renal Disease study (MDRD) equation considering gender, age, serum creatinine of patients (Klahr, 1989). The equation is as following. GFR = $186.3 \times (Scr)^{-1.154} \times (age, yr)^{-0.203} \times 1.212$ (if African American) $\times 0.742$ (if female) (conventional units).

4) Demographic characteristics

General characteristics of participants included gender, age, educational level, religion, marital status, job, monthly income of family, experience of similar education and etc.

5. Data collection and ethical consideration

After receiving approval from the hospital Institute of Review Board (IRB) (No. 2011-007), the study participants were recruited using flyers on information boards at outpatient department of nephrology. If patients contacted research persons, study purposes and process, confidentiality, anonymity and rights of rejecting participation were explained. Persons meeting the study criteria were recruited and their informed consents were obtained.

The control group completed the study first to prevent contamination of experiment. The control group (n = 30) took a pre-test, and post-tests 4 and 8 weeks after the pre-test to measure knowledge of CKD and self-care practice using questionnaires (Figure 1). Physiological indicators of kidney function were checked for pre-test and after 8 weeks, for post-test. The experimental group (n = 31) took a) a pre-test, b) received 3 weeks of face-to-face education and individualized consultation (1st intervention), c) then after a week, of practice completed the 1st post-test and then received re-enforcement education and consultation (2nd intervention), and d) after 4 weeks of practice took the 2nd post-test. Before the program began, a coordinating nurse reviewed the results of the pre-test and informed the lecturers of characteristics of persons for individualized and effective education (Table 1). Therefore, lecturers could identify issues in patients during the 3 weeks before the educational program. Physiological indicators of kidney function were checked at pre-test and after 8 weeks, for post-test. Both the control and experimental groups took general maintenance treatments for CKD.

6. Data analysis

Data were analyzed using SPSS software version 18.0 (SPSS, Inc., Chicago, IL, USA). Descriptive statistics were used to characterize the demographic and study variables. A χ^2-test and t-test were used to examine the homogeneity at pre-test between groups in general characteristics and study variables. The repeated measures ANOVA with bonferroni post hoc was used to determine significant differences in changes of knowledge, self-care practice and kidney function between the groups. A p value of $< .05$ was considered statistically significant. The internal consistency of reliability of instruments was examined using Cronbach's alpha coefficient.

RESULTS

1. Homogeneity of demographic characteristics and study variables at pretest

Comparison of experimental and control groups according to the descriptive characteristics of participants and study variables at pre-test is given in Table 2. There were no statistically significant differences between the experimental group and the control group in terms of demographic characteristics and study variables at pre-test.

2. Effects of the face-to-face self-management program on knowledge and self-care practice

The results of statistical analysis revealed that knowledge about CKD in the experimental group significantly improved overtime compared to the control group ($F = 20.33$, $p < .001$) (Table 3). There were significant differences of knowledge about CKD between experimental and control groups ($F = 7.12$, $p = .010$). Knowledge about CKD of participants was changed significantly by time ($F = 26.12$, $p < .001$). Post hoc analysis also revealed that level of knowledge a week after the face-to-face education was significantly higher than one at pre-test ($p < .001$). Knowledge 4 weeks after the re-enforcement education also was significantly higher

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Table 2. Homogeneity Test between Experimental and Control Groups (*N*=61)

Variables	Categories	Exp. (n=31) n(%) or M±SD	Cont. (n=30) n(%) or M±SD	χ^2 or t	*p*
Gender	Male	21 (67.7)	21 (70.0)	0.04	.849
	Female	10 (32.3)	9 (30.0)		
Age (year)	≤59	18 (58.1)	15 (50.0)	0.61	.354
	≥60	13 (41.9)	15 (50.0)		
		53.93±13.47	58.33±12.54	-1.32	.192
Education	<Middle school	8 (25.8)	11 (36.7)	1.97	.374
	High school	12 (38.7)	13 (43.3)		
	≥University	11 (35.5)	6 (20.0)		
Religion	Yes	16 (51.6)	15 (50.0)	0.02	.900
	No	15 (48.4)	15 (50.0)		
Marital status	Married	22 (71.0)	22 (73.3)	0.04	.837
	Unmarried	9 (29.0)	8 (26.7)		
Job	Yes	18 (58.1)	10 (33.3)	3.77	.053
	No	13 (41.9)	20 (66.7)		
Monthly income (10,000 won)	≤200	14 (45.2)	17 (56.7)	0.81	.369
	≥201	17 (54.8)	13 (43.3)		
Type of caregiver	Spouse	12 (38.7)	12 (40.0)	5.25	.072
	Parent or children	10 (32.3)	3 (10.0)		
	Others (siblings)	9 (29.0)	15 (50.0)		
Experience of similar education	Yes	13 (41.9)	6 (20.0)	3.42	.064
	No	18 (58.1)	24 (80.0)		
Knowledge		10.32±4.64	11.13±3.11	-0.80	.428
Self-care practice		3.56±0.41	3.76±0.39	-1.96	.055
Physiological index	BUN (mg/dL)	30.32±13.29	26.33±11.32	1.26	.213
	Creatinine (mg/dL)	2.09±0.71	1.81±0.49	1.79	.078
	Sodium (mEq/L)	139.16±2.48	139.57±2.85	-0.59	.555
	Potassium (mEq/L)	4.75±0.59	4.67±0.66	0.49	.629
	Calcium (mg/dL)	8.74±0.60	8.75±0.42	-0.08	.933
	Phosphate (mg/dL)	3.71±0.81	3.73±0.63	-0.11	.914
	Hemoglobin (mg/dL)	12.09±2.32	12.61±1.84	-0.97	.335
	GFR (mL/min)	38.60±15.89	43.93±11.55	-1.49	.141

Exp.=Experimental group Cont.=Control group; BUN=Blood urea nitrogen; GFR=Glomerular filtration rate.

Table 3. Changes in Knowledge and Self-care Practice over Time (*N*=61)

Variables	Measures	Exp. (n=31) M±SD	Cont. (n=30) M±SD	Source	F	*p*	Bonferroni
Knowledge	Baseline[a]	10.32±4.64	11.13±3.12	Group	7.12	.010	a<b<c
	4th week[b]	14.22±2.19	11.50±3.62	Time	26.12	<.001	
	8th week[c]	15.41±2.32	11.40±3.82	Group*time	20.33	<.001	
Self-care practice	Baseline	3.55±0.42	3.79±0.39	Group	0.48	.491	a<b,c
	4th week	3.81±0.34	3.84±0.41	Time	24.53	<.001	
	8th week	3.88±0.41	3.85±0.42	Group*time	7.27	.001	

Exp.=Experimental group; Cont.=Control group.

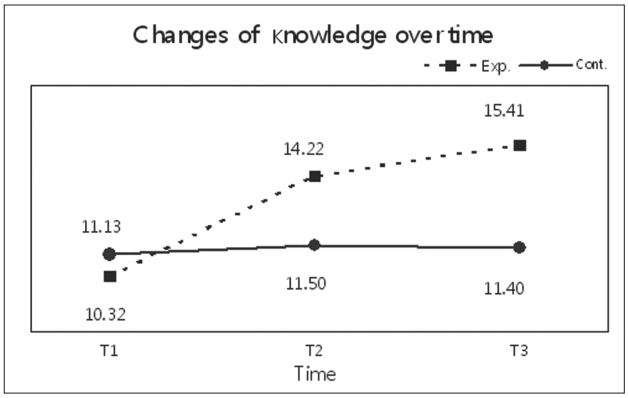
than one a week after the face-to-face education (p=.024) (Figure 2).

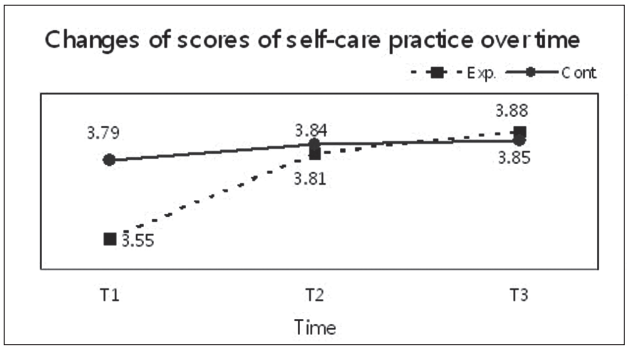
Scores of the self-care practice scale in the experimental group significantly increased overtime compared to the control group (F=7.27, p=.001) (Table 3). There were no significant differences of self-care practice between the experimental and control groups (F=0.48, p=.491). Self-care practice of participants was changed significantly by time (F=24.53, p<.001). Post hoc analysis also revealed that scores of self-care practice four weeks after the pre-test was significantly higher than one at pre-test (p<.001). However, scores of self-care practice four weeks after the re-enforcement education didn't have any significant differences from those a week after the face-to-face education (p=.114) (Figure 2).

3. Effects of the face-to-face self-management program on kidney function

Physiological indicators of kidney function were BUN, creatinine, so-

dium, potassium, calcium, phosphate, hemoglobin and GFR. However, nothing was significantly improved in both groups (Table 4). Only hemoglobin was slightly improved in the experimental group compared to the control group, but it was not statistically significant. On the other hand, level of sodium increased in the experimental group significantly.





T1 = pre-test; T2 = 4 weeks after the T1; T3 = 4 weeks after the T2.
Exp. = Experimental group; Cont. = Control group.

Figure 2. Changes of knowledge and self-care practice overtime.

DISCUSSION

In this study for patients with CKD before the renal replacement therapy a face-to-face self-management educational program was developed and examined for its effects of delaying the disease progression to be ESRD. The program was delivered under nurse coordination using face to face education and consultation by a physician, a nutritionist and a nurse, and additional re-enforcement education and consultation by a nurse coordinator. Levels of knowledge about CKD, self-care practice and kidney function were evaluated as outcome variables.

Level of knowledge about CKD was significantly improved in the experimental group compared to the control group. The experimental group reported continuous increases of knowledge from pre-test to the 1st post-test a week after the face-to-face education and to the 2nd post-test four weeks after the re-enforcement education. However, Lee and her colleagues (2009) found that among non-compliant hemodialysis patients an individualized educational program for 20 minutes three times a week for six weeks couldn't increase knowledge about hemodialysis. It might be because the Lee's study included non-compliant patients experiencing disability of self-management already. On the other hand, a study of early hemodialysis patients found that a 4-week educational program increased patients' knowledge (Kim & Kim, 2008). In this present study multidisciplinary face to face education and consulta-

Table 4. Differences in Physiological Indicators between Groups (*N* = 61)

Variables	Groups	Pretest	Posttest	Pre-Post	t	*p*
		M ± SD	M ± SD	M ± SD		
BUN	Exp. (n = 31)	30.32 ± 13.29	30.23 ± 12.26	-0.09 ± 7.72	0.29	.773
	Cont. (n = 30)	26.33 ± 11.32	25.60 ± 11.46	-0.73 ± 9.37		
Cr	Exp. (n = 31)	2.10 ± 0.71	2.10 ± 0.74	0.00 ± 0.30	0.10	.924
	Cont. (n = 30)	1.81 ± 0.49	1.81 ± 0.52	0.00 ± 0.20		
Na	Exp. (n = 31)	139.16 ± 2.48	140.13 ± 2.17	0.97 ± 1.81	2.21	.031
	Cont. (n = 30)	139.57 ± 2.85	139.33 ± 2.54	-0.23 ± 2.40		
K	Exp. (n = 31)	4.75 ± 0.59	4.88 ± 0.54	0.13 ± 0.58	0.33	.746
	Cont. (n = 30)	4.67 ± 0.66	4.75 ± 0.52	0.08 ± 0.66		
Ca	Exp. (n = 31)	8.74 ± 0.60	8.84 ± 0.45	0.10 ± 0.42	0.58	.562
	Cont. (n = 30)	8.75 ± 0.42	8.79 ± 0.41	0.04 ± 0.32		
P	Exp. (n = 31)	3.71 ± 0.81	3.87 ± 0.72	0.16 ± 0.77	1.00	.322
	Cont. (n = 30)	3.73 ± 0.63	3.72 ± 0.74	-0.01 ± 0.57		
Hb	Exp. (n = 31)	12.09 ± 2.32	12.19 ± 2.23	0.10 ± 0.86	0.74	.464
	Cont. (n = 30)	12.61 ± 1.84	12.56 ± 1.87	-0.05 ± 0.75		
GFR	Exp. (n = 31)	38.60 ± 15.89	38.22 ± 14.96	-0.37 ± 5.81	0.23	.822
	Cont. (n = 30)	43.93 ± 11.55	43.86 ± 11.73	-0.06 ± 4.89		

Exp. = Experimental group; Cont. = Control group; BUN = Blood urea nitrogen; Cr = Creatinine; Hb = Hemoglobin; GFR = Glomerular filtration rate.

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tion by CKD experts such as a physician, a nurse and a nutritionist, followed by re-enforcement education and consultation by a nurse coordinator were more effective and could identify individualized needs and difficulties. Therefore, self-management programs with face-to-face education and consultation for small group patients followed by re-enforcement education and consultation by a nurse coordinator could be efficient and cost saving methods as well as previous standardized education using a big class or web-based program. Moreover, the present self-management program could allow more opportunities of direct interactions between patients and health care providers.

Scores of self-care practice in the experimental group were significantly improved by the face-to-face self-care management program compared to the control group. However, in the experimental group scores of self-care practice four weeks after the re-enforcement education didn't have any significant differences from those a week after the face-to-face education. Previous studies of hemodialysis patients also found that a 4-week education program improved self-care practice at the 2nd or 4th week after the program (Kim & Kim, 2008; Park & Lee, 2010). While previous studies provided the education to 21 or 35 patients in the classroom at the same time, this study used small group education around 3 to 5 patients to consider individual characteristics followed by re-enforcement consultation at the 1st week after education for each person. That is, through the present face-to-face self-management program patients could identify their own problems with self-care practice, and resources which they could utilize. Although there was not statistically significant difference in scores of self-care practice from the 1st post-test a week after the face-to-face education to the 2nd post-test four weeks after the re-enforcement education, scores of the experimental group increased from 3.81 to 3.88. Therefore, rather than standardized education, individualized small group education and consultation by interdisciplinary experts, and re-enforcement education and consultation under a nurse's coordination will be more effective to improve level of self-care practice in patients with CKD.

Physiological indicators of kidney function were not significantly improved in both groups during 8 weeks. Only hemoglobin was slightly improved in the experimental group compared to the control group, but it was not statistically significant. On the other hand, level of serum sodium increased in the experimental group significantly. Park and Lee (2010) also found that serum potassium and phosphate were not significantly changed in both experimental and control groups of hemodialysis patients during 4 weeks. It might be due to the short period of monitoring intervals. However, among early hemodialysis patients, serum potassium and phosphate were significantly improved at the 1st and 4th week after education (Kim, 2012). Although Kim and Kim (2008) also found that serum potassium and phosphate were significantly improved in 4 weeks after education in early hemodialysis patients, it should be considered all of participants in their study were taking hemodialysis therapy already. A study of in-hospital CKD education program suggested prospective evaluation of clinical outcomes to continue the effects of education (Rioux, Cheema, Bargman, Watson, & Chan, 2011). Therefore, continuous re-enforcement consultation more than a month with monitoring of physiological indicators is needed to improve kidney function.

Based in these results, it should be also noted that study site was one outpatient department of university hospital, resulted in some limitations in this study; however, this study conducted in one hospital site could control various hospital environment characteristics including staff, policy and facility. Additionally, as the program module and its contents were developed to be able to be utilized in other hospitals, each hospital could apply the program for their own patients. Although the study used a non-synchronized design, the spread of experiment could be prevented.

CONCLUSION

The study found that the self-management program including face-to-face education and consultation, and additional re-enforcement education and consultation improved knowledge about CKD and self-care practice in patients with CKD before the renal replacement therapy. Although the face to face education consisting of a physician, a dietician and a nurse may be a burden in staffing and operating cost, it is structured education with consultation by each educator considering individual needs and conditions, followed by a nurse coordinator's continuous re-enforcement consultation. Therefore, it may provide more opportunities for patients to directly interact with health care providers than the standardized education using web-based education, videos or booklets. Current health care industry may have alienated health care providers from patients by reason of early adaption of high technology, resulted in decreasing opportunities of direct care for patients. Therefore, many individual programs such as this face-to-face program and consultation followed by re-enforcement education and consultation should be developed in hospitals regarding quality of care for patients.

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