



Effect of Educational Intervention Based on Self-efficacy Theory on Adherence to Dietary and Fluids-intake Restriction in Hemodialysis Patients

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ABSTRACT

Aims Hemodialysis patients experience numerous problems in the fields of self-care in adherence to dietary and fluids-intake restriction. For increasing their self-care, they require controlling these problems. This can be done with the education based on a behavior change theory, this study attempted to determine the effect of the educational intervention based on SET (Self-efficacy Theory) on adherence to diet and fluid-intake restriction in patients with hemodialysis.

Materials & Methods The present study is a randomized clinical trial that was conducted on 70 hemodialysis patients of Qom City in 2016 (35 in the trial group, 35 in the control group). The data were collected by demographic questionnaire, self-efficacy (SUPPH) and researcher-made validated and relied questionnaire of adherence to dietary and fluids-intake restriction (8 and 6 questions, respectively) in two steps (before and three months after education). The educational program was performed for the trial group in two half-hour sessions. The data were analyzed by SPSS 16, using paired-test, Independent t-test, Chi-square and Mann-Whitney test.

Findings Before the test, there was no significant difference in adherence to dietary ($p=0.49$) and fluids-intake restriction ($p=1.00$). After training, significant differences were observed between the two groups in adherence to dietary ($p<0.001$) and fluids-intake restriction ($p<0.001$). There was significant difference between pre-test and post-test in the control group ($p<0.05$).

Conclusion The educational intervention based on Self-efficacy Theory has the effect on adherence to diet and fluid-intake restriction in patients with hemodialysis.

Keywords Hemodialysis; Self-Efficacy; Education; Diet

CITATION LINKS

- [1] The effect of empowerment program on empowerment ...
- [2] Brunner & Suddarth's textbook of medical-surgical ...
- [3] Experience of Iranian persons receiving emodialysis ...
- [4] Effect of an educational plan based on ...
- [5] Influence of family cares on haemodialyzed patients ...
- [6] Self-efficacy training for patients with ...
- [7] Self-care strategies to reduce fluid intake ...
- [8] Evaluation of perceived social support of patients ...
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- [10] Nonadherence with diet and fluid restrictions and ...
- [11] Impact of clinical pharmacist-provided ...
- [12] Effectiveness of a nutrition education program for the ...
- [13] Effect of personalized nutritional counseling in maintenance ...
- [14] Patient empowerment in theory and practice: Polysemy ...
- [15] Social foundations of thought and action: A social ...
- [16] Self-care self-efficacy, depression, and quality ...
- [17] Effect of cognitive-behavioral intervention on adherence to dietary and ...
- [18] A measurement of self-care ...
- [19] The association between social-psychological factors and treatment ...
- [20] The effect of nutrition training on food diet adherence in non-dialysis chronic ...
- [21] A comparison of face to face and video-based education ...
- [22] The Effects of training through text ...
- [23] Knowledge of dietary restrictions and the medical consequences of ...
- [24] Fluid compliance among patients having ...
- [25] Effects of applying continuous care model ...
- [26] The effect of dietary regimen education ...
- [27] The effects of education methods on body weight and some ...
- [28] Effects of home education on physical health status ...
- [29] The effect of self-care educational program on ...
- [30] The effect of diet training on variations in blood ...
- [31] Harrison's principles of internal ...
- [32] The study of the effect of Orem self-care model on ...
- [33] The relationship between blood pressure and ...
- [34] The relationship between perceived social support ...
- [35] Relationship of self-efficacy with therapeutic ...
- [36] Effect of a self-efficacy promotion training programme ...
- [37] The effect of quality of life training on self-efficacy in patients ...
- [38] Group intervention to improve quality of life in ...
- [39] Cognitive behavioral therapy for sleep disturbance in ...

Introduction

Chronic Renal Failure (CRF) is the process of a remarkable, continuous, and irreversible drop of the number of nephrons that leads to loss of kidney's ability in the disposal of metabolic wastes and containing fluids and electrolytes. This failure leads to the increase of blood urea syndrome [1]. According to statistics, renal patients are increasing by 15% in Iran every year. In the last stage of CRF, using alternative methods is necessary for survival in order to make up for the lost function of kidneys. These methods include hemodialysis, peritoneal dialysis, and kidney transplant, hemodialysis is the most common methods [2,3]. Patients with hemodialysis suffer from several problems and need following this method and require a lot of changes in their lifestyles to survive [4]. The patients' successful treatment depends on following diet therapy including adherence to diet and fluids-intake restriction. The increase in inappropriate food and fluids causes an increase in producing metabolites in the blood and fluids poisoning, resulting in complications and premature mortality [2]. More than 50% of hemodialysis patients do not adhere to diet and fluids-intake restriction [5]. Although hemodialysis causes disposing large amounts of fluids and wastes from the body in a short time, the fluid-intake restriction is necessary [6]. These patients usually do not restrict their fluid-intake; this results in serious consequences including physical disorders, depression, lung edema, Congestive Heart Failure (CHF), and premature mortality [7]. Consuming daily fluids is highly important for patients with hemodialysis because they are likely to face fluid accumulation in the body and problems such as general body swelling, asthma, cardiopulmonary disorders, overweight, etc. that threaten their health [2]. Intra-Dialysis Weight Gain (IDWG) is a visual method for measuring the rate of adherence to fluid-intake restriction in patients with hemodialysis; it refers to the amount of body accumulated fluids between two sessions of dialysis. An IDWG more than 2.5 kg shows that the patient has not restricted fluid-intake [8]. Blood pressure is another valuable parameter for measuring the body fluids. An increase in the blood pressure refers to the increase of blood volume and a decrease in it shows the decrease in blood volume and dehydration. An increase in blood pressure

can cause extensive fluids, vascular resistance, cardiac irritability, and an increase in blood concentration [9].

Changes in adherence to diet and fluid-intake restriction are necessary for these patients that include: precise protein-intake, consumable liquid fitting exfoliating liquid and consumable sodium fitting exfoliating sodium. Also, restrictions on potassium and enough calories and complementary intake are necessary [10]. Identifying factors that may affect lack of adherence to diet and fluid-intake restriction is highly important for health-care attendants to apply interventions in order to improve this adherence among patients [11]. Morante *et al.* referred to the necessity of using training methods to improve hemodialysis patients' diet and introduced applying group nutritional training as a method for improving the patients' knowledge and serum nutritional indicators [12]. Garagaza *et al.* also pointed to patients' empowerment in order to achieve an effective dialysis and improve their nutritional status through training as an important step to increase their ability of self-care [13].

Evidence shows that increasing the dialysis patients' self-efficacy resulted in weight control between the dialysis sessions, a decrease in hospitalization, and improvement in life quality, in such a manner that self-efficacy promotion, better self-care, treatment acceptance, and physical and mental health promotion were followed [14, 15]. Self-Efficacy Theory (SET) is based on individual's self-judgment about managing self-care activities to achieve desirable results. This judgment creates a bridge between the individual's knowledge and care behaviors. This theory is reliable for dialysis patients, and it can be understood that if these patients having enough self-confident about self-care can afford it more effectively [16].

This research attempted to determine the effect of an educational intervention based on SET (Self-efficacy Theory) on adherence to diet and fluid-intake restriction in patients with hemodialysis.

Material and Methods

The current study is a clinical trial. Subjects included patients with hemodialysis referring to the Dialysis Department of one of Qom City hospitals in 2016. According to a study by

Zolfaghari *et al.* [17] and regarding the type 1 error of 0.05 and the type 2 error of 0.2, the number of participants was 70 persons who were divided into two trial and control groups (35 persons in the each group) using randomized sampling method. In order to avoid the participants' communication in the two groups with each other, they were chosen in two separate days. Inclusion criteria included the age of 20-60 years, hemodialysis therapy for at least 6 months, 3 sessions a week, 4 hours each, lack of chronic physical disorders including, cardiac, respiratory, and liver debilitating disorders, and lack mental disorders such as severe depression. Exclusion criteria included the patients' lack of ability to attend the training sessions, migration intentions, and undergoing a kidney transplant, death, and not using a dialyzer and a dialysis solution according to the physician's advice. All of the above information was collected through interviewing the patients and checking their medical records by the researcher.

In this study, private information form, health promotion strategies questionnaire, a researcher-made questionnaire of evaluating the patients' rate of adherence to diet and fluid-intake restriction, a barometer, and scales were used. The first part included private information such as age, gender, marital, educational and employment status, duration of the renal disease, etc. In the second part, the questionnaire of Strategies Used by People to Promote Health (SUPPH) by Lev and Oewn was applied to determine self-efficacy consisting of 29 questions with a 1-5-choice scale from completely agree to completely disagree. The questions were designed as double-domain, and the accessible range was 29 to 145 scores. The questions checked the patients' reliability in Likert scale from too much to very little [18]. This instrument's reliability and validity were calculated in a study by Khalili *et al.* with Chronbakh alpha coefficient of 96% [19].

The third part was the researcher-made questionnaire including the following parts: evaluating adherence to diet (8Qs), and fluid-intake restriction (6Qs) in patients with hemodialysis that was checked according to a 5-choice scale (*always, most often, sometimes, rarely, and never*). According to the answers, each question received a score of 0 to 34 in

the area of adherence to diet and 0 to 24 in the area of fluid-intake restriction. Reliability of the mentioned questionnaire was confirmed through internal consistency, and the Chronbakh alpha coefficients of 0.79 and 0.72 were achieved, respectively. Its validity was also confirmed and adjusted using the comments and suggestions of eight faculty members of Qom University of Medical Sciences and the Dialysis Department members. The last part included the checklist of the recorded intra-dialysis weight gain and the patients' systolic blood pressure.

The patients were weighed before and after each dialysis session, and their pre-dialysis weight was compared with their dry weight and the difference was considered as Intra-Dialysis Weight Gain. Their blood pressure was also measured and recorded by the Dialysis Department nurses. For showing the reliability of measuring blood pressure and body weight, all samples were measured by dial barometer (Microlife, Swiss) and a digital scale (Seca, Germany).

After taking ethics code and needed licenses from the Research Deputy of Qom University of Medical Sciences, the researchers entered the Dialysis Department of Kamkar-Arabnia Hospital and did the sampling. The research goals and objectives were explained to the patients at the beginning of the study. Furthermore, a written consent letter was received from all patients. Afterwards, a pre-test was taken from both groups through an organized interview and the mentioned questionnaire. The trial group members received a call to be informed of the training sessions' date and time. They received a training plan based on the Self-Efficacy Theory (SET) in addition to routine cares and training, while the control group patients received only the routine training. Educational content was collected for the trial group using reliable scientific references and confirmed by the head of Dialysis Department and five nurses. Education axes were according to the factors existed in the measuring instruments and related to adherence to diet and fluid-intake restriction. Training sessions were held in two group sessions in a training class in the hospital within 30 minutes; they were changeable based on the attendants' requirements and desires. In cases that the patients' questions were out of the

researcher's knowledge, the patients and their families were referred to specialists. All patients received educational booklets and pamphlets at the end of the sessions. The sessions were held using Lecture, Q & A, and group discussion methods with the presence of the training nurses and people with favorable self-care conditions. One of each patient's family member also participated in the classes. Educational intervention stages were conducted based on SET in such a manner that the factors including successful experiences, dividing behaviors into smaller parts, and alternative experiments were applied to increase the patients' self-efficacy. In addition, one or two patients with favorable self-care conditions were assigned in each group to share their experiences with other patients and encourage them. Furthermore, the trial group patients received nutritional handout and booklet through the social networks like Telegram. Three months after the educational intervention, the patients were followed-up by the researcher's visiting in the Dialysis Department. The control group patients received the educational handout, considering ethics. Three months after the intervention, post-test questionnaire (information about the patients' adherence to diet and fluid-intake restriction conditions) was collected from both groups through an organized interview in the hemodialysis department, after the researcher's repeated follow-ups and arrangements, in person. Data were analyzed using SPSS 16 software. The differences between demographic variables were determined by Chi-square test and Man-Whitney's test. An independent t-test was used to determine the statistical mean difference between two groups and the paired t-test was used to compare mean statistical each group before and after the intervention.

Findings

The patients in the trial and control groups were mostly males. The statistical mean of the trial and control patients' age were 41.80 ± 9.68 and 43.74 ± 11.65 , respectively that were not significantly different the statistical mean of renal disease duration in the study groups were 8.47 ± 7.54 and 9.91 ± 7.91 years respectively, which were not significantly different between the two groups. Generally,

the two groups were equal in terms of demographic variables ($p=0.45$; Table 1).

Table 1) Distribution of absolute and relative frequency (The numbers in parentheses are percent) of demographic variables in the samples (35 people in each group)

Variables	Trial Group	Control Group
Gender		
Male	20 (57.1)	26 (74.3)
Female	15 (42.9)	9 (25.7)
Educational Level		
Elementary	12 (34.3)	16 (45.7)
Junior School	7 (20.0)	8 (22.9)
High School	13 (37.1)	9 (25.7)
Academic	3 (8.6)	2 (5.7)
Marital Status		
Married	29 (82.9)	27 (77.1)
Single	6 (17.1)	8 (22.9)
Employment Status		
Employee	3 (8.6)	2 (5.7)
Worker	3 (8.6)	2 (5.7)
Unemployed	9 (25.7)	8 (22.9)
Housewife	11 (31.4)	7 (20.0)
Retired	2 (5.7)	3 (8.6)
Free Job	7 (20.0)	11 (31.4)
Other	0 (0)	2 (5.7)
Smoking		
Yes	5 (14.3)	7 (20.0)
No	30 (85.7)	28 (80.0)
Insurance status		
Yes	33 (94.3)	34 (97.1)
No	2 (5.7)	1 (2.9)

There was a significant difference between the scores of adherence to diet in the two groups after the educational intervention ($p<0.001$). Furthermore, the average score of fluid-intake restriction in the trial group was significantly different in comparison to the control group ($p<0.001$). The average scores of adherence to diet and fluid-intake restriction were significantly different in the control group before and after the intervention ($p<0.05$). There was no significant difference in the average score of intra-dialysis weight gain in the trial group before and after the intervention ($p>0.05$; Table 2).

There was a significant difference between the two groups before and after the intervention ($p<0.001$). However, there was no significant difference in terms of intra-dialysis weight gain and systolic blood pressure between the two groups after the training ($p>0.05$; Table 3).

Table 2) Comparison of The statistical mean of variables in trial and control groups (35 people in each group)

Variables	Trial Group	Control Group	P value*
Self-efficacy			
Before	86.28±12.38	84.24±11.88	0.524
After	100.05±11.82	83.68±10.21	<0.001
P value**	<0.001	0.454	
Adherence to dietary			
Before	17.94±2.96	17.42±3.28	0.494
After	24.45±3.04	18.22±2.87	<0.001
P value**	<0.001	0.002	
Fluids-intake restriction			
Before	10.71±2.21	10.71±2.42	1.000
After	15.77±2.93	11.22±2.52	<0.001
P value**	<0.001	0.007	
Intra-Dialysis weight gain			
Before	2.19±0.81	2.34±0.84	0.456
After	2.07±0.87	2.37±0.96	0.173
P value**	0.409	0.798	
Systolic blood pressure			
Before	126.00±18.50	126.28±27.55	0.960
After	132.71±23.30	126.00±29.52	0.295
P value**	0.056	0.953	

* Independent t-test

**Paired t-test

Table 3) Comparison of The statistical average of variables' score changes in trial and control groups (35 people in each group)

Variables	Trial group	Control group	P value*
Self-Efficacy	13.77±10.38	- 0.74±5.79	<0.001
Adherence to Dietary	6.51±3.51	0.84±1.41	<0.001
Fluids-Intake Restriction	5.05±3.13	0.51±1.06	<0.001
Intra Dialysis Weight Gain	-0.11±0.82	0.03±0.85	0.445
Systolic Blood Pressure	6.71±20.03	-0.28±28.64	0.241

* Independent t-test

Discussion

The results of present study showed a significant difference between the average score of adherence to diet and fluid-intake restriction among the hemodialysis patients before and after the intervention. This obvious statistical difference between the scores before and after the intervention might be due to applying the educational intervention according to SET, which is a Behavioral Change Theory (BCT) that led to a remarkable increase in the rate of adherence to diet and fluid-intake restriction in patients. The increase in the score of adherence to diet

and fluid-intake restriction after the training shows that the patients have applied the training about following the diet and the way of consuming and measuring fluids. It seems that sharing experiences by the patients with a favorable self-care condition with other patients and encouraging them resulted in increasing their self-efficacy and more training effectiveness in special aspects of diet. Poorshaban *et al.* stated that training through the educational package, individual and group methods, and pamphlets can be useful for improving CRF patients' adherence to diet [20].

The results of this study are in line with the study of Zolfaghari *et al.* [17] that it was done on 70 hemodialysis patients. There was no significant difference in the rate of adherence to diet and fluid-intake restriction between the two groups before the intervention. But after the intervention, there was a significant difference between the two groups in the rate of adherence to diet and fluid-intake restriction [17]. Furthermore, the study of Hassan-zadeh *et al.* showed a significant difference in the scores of attitude towards adherence to diet and fluids in the trial group before and after the intervention [21]. Nasiri *et al.* reported an improvement in the self-care deflections, the statistical mean of diet and fluid-intake areas after the training showed the effect of the conducted intervention [4], which are in line with the current study results. In study of Estaji *et al.* was showed a significant difference in accepting diet before and after the training, but there was no significant difference in accepting fluid-intake restriction [22]. There was a significant difference of mean in the mentioned areas in the control group before and after the intervention, likely due to the effect of the test and sensitivity in the control group to achieve information and more self-care.

It has been reported that training patients with hemodialysis in terms of adherence to diet and fluid-intake restriction can result in their weight loss [23, 24]; however, in the current study, despite the significant increase of the average score of fluid-intake restriction after the educational intervention, the average of intra-dialysis weight gain showed no significant difference in the trial group before and after the intervention. In the study of Rahimi *et al.* no significant difference in intra-

dialysis weight gain before and after applying persistent care model was reported that is in line with the current study [25].

In a study by Baraz *et al.* there was a significant difference in the mean of intra-dialysis weight gain in the trial group before and after the training [26]. Barnett *et al.* also stated that the patients lost weight significantly after the training [24]. In a study by Abbassi *et al.* [27] on checking the effect of training on the body weight changes and some serum indicators in hemodialysis patients, the training led to the patients' weight loss, which is contrary to the current study findings.

In the present study, there was no significant difference in the average scores of intra-dialysis weight gain after the educational training between the two study groups, but several studies [22, 28-30] showed a decrease in intra-dialysis weight gain after the training.

It can be justified that in the study population, the patients were undergoing dialysis for at most 12 hours a week, while Skuorki stated that patients undergo dialysis for 20 to 24 hours a week [31]. Lack of dialysis sufficiency is an effective reason for the insignificant intra-dialysis weight gain in these patients; thus, increasing dialysis sessions with correcting the patients' diet can remarkably increase these variables [31, 32]. In addition, the difference between the current study results and other studies and lack of a significant statistical difference may be due to the patients' clothes during scaling, changes in seasons, styles, patient's dressing culture, increases in body fats, weight gain or loss, etc. In this study, sampling was done in summer (June to September) when the weather is too hot and with regard to the length of days, the high weather temperature and high thirst, restricting fluid-intake was more complicated for patients, and surely affected their intra-dialysis weight gain.

Some studies have shown that an increase in patient's dry weight can increase their blood pressure, which can be controlled and backed to normal by training [9, 33]. However, the current study showed no significant difference in the average scores of systolic blood pressure in the trial group before and after the educational intervention. Contrary to the current study, studies by Hemmati Maslakpak *et al.* [28], Baraz *et al.* [29], and Jafari *et al.* [30] reported the effect of training

patients with hemodialysis on reducing systolic blood pressure. This difference can be due to the patient's different cultural and social conditions.

According to previous studies such Esmaeili *et al.* [34] and Rambod *et al.* [35], there was a significant difference between self-efficacy and adherence to diet and fluid-intake restriction and intra-dialysis weight gain, and patients with higher self-efficacies had lower blood potassium, phosphate, nitrogen, and urea, showing their higher adherence to diet. Therefore, in the current study, self-efficacy in the patients with hemodialysis was also studied. According to the results, self-efficacy significantly increased in the trial group after the intervention that shows the effect of training based on SET. In a study by Aliasgharpour *et al.* [36], the average of weight gain and self-efficacy in the trial group also significantly decreased and increased, respectively compared to control group. In a study by Soltani-nejad [37], also the trial group patients' self-efficacy increased after the training. Other studies reported similar results too [38, 39]. However, in a study by Habib-zade *et al.*, there was no significant difference between the trial and control groups in terms of self-efficacy in the post-test stage, which is not in line with our study [32]. Training based on SET led to adherence to diet and fluid-intake restriction in the patients with hemodialysis. Therefore, holding periodic and codified training sessions based on this theory can improve these patients' health conditions.

Strengths of the present study include using group training method with the presence of one of the patient's family members to increase the training's effectiveness and using other training methods such as training through the Internet to train the patients on diet and filling in the questionnaires by the researcher visiting the patients and interviewing them. The study limitations also include problems in the follow-ups during the dialysis sessions and gathering patients together between the dialysis sessions, and some patients' unwillingness to cooperate.

The suggestions of this study include training of dialysis nurses' on behavior change theories, inviting other family members to attend classes, using the experiences of patients with favorable self-care status in

education programs, applying of this theory (self-efficacy) in training of patients undergoing peritoneal dialysis.

Conclusion

The educational intervention based on Self-efficacy Theory has the effect on adherence to diet and fluid-intake restriction in patients with hemodialysis.

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Conflict of interest: Non-declared.

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Authors' Contribution: Ramezani T. (First author), Introduction author/ Methodologist/ Original researcher/ Discussion author (45%); Sharifirad Gh. (Second author), Discussion author (10%); Gharlipour Z. (Third author), Introduction author (10%); Mohebi S. (Fourth author), Methodologist/ Original researcher/ Statistical analyst (35%)

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