

## The Effects of Training and Follow-up via Text Messaging on Weight Control in Hemodialysis Patients

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### ABSTRACT

Significant changes in weight between dialysis sessions in most patients with chronic renal failure indicate non-compliance with salt and fluid restrictions. Treatment of dialysis patients will not be effective without their participation via some self-care activities. This study aimed to investigate the effects of training and follow-up via text messaging on weight control in hemodialysis patients.

In this clinical trial, 70 hemodialysis patients were randomly assigned into two groups: face to face training (35) and training with SMS follow-up (n = 35). Both groups received face to face training on self-care behaviors. The SMS follow-up group members were sent text messages. A check list was used to measure the patients' weight before and 2 and 6 weeks after training in both groups. Data were analyzed using SPSS20 via paired and independent t-tests. There was a significant difference between the training group ( $P < 0.001$ ) and SMS follow-up group ( $P < 0.001$ ) in terms of mean weight changes before the training and two weeks after training. There was no significant difference between weight change before the training and after 6 weeks of training ( $P = 0.972$ ) in the training group. However, in the SMS follow-up ( $P < 0.001$ ) this difference was statistically significant.

Training along with follow-up via SMS is effective in weight management in patients undergoing hemodialysis. Given the cost effectiveness of this method, it is recommended for following up dialysis patients.

**KEYWORDS:** Weight Control, Text Messaging, Hemodialysis

### INTRODUCTION

In chronic renal failure (CRF) which is a progressive and irreversible disorder, the ability of the kidneys to maintain fluid and electrolyte and to dispose metabolic waste is lost, and uremia occurs (1). Despite significant advances in medical science, CRF is still a major problem due to its complications and high cost of the most common treatment procedure, i.e. hemodialysis. Every year the number of hemodialysis patients increases (2). The prevalence of CRF in the world accounts for 242 in 1000 individuals to which 8% is added annually (3). Currently there are 15,000 patients with CRF in Tehran, 3,700 of which are being treated with hemodialysis. Annually, about 20 thousand people are added to hemodialysis patients in our country. The total annual cost of treating these patients is about 1,500 billion IRRs (4).

Obviously, dialysis alone cannot cause the patient's survival and adherence with a treatment regimen by the patient is essential. Failure to follow the treatment regimen, including dietary restrictions and drug therapy in patients with CRF is one of the major problems in their treatment. Significant weight changes between dialysis sessions resulting in overall inflation in most patients undergoing hemodialysis are due to the neglect of self-care behaviors (2). According to studies, weight gain occurs in many patients treated with dialysis and failure to comply with the fluid intake restrictions is common in dialysis patients. This has serious consequences for patients, including impaired physical abilities, depression, pulmonary edema, congestive heart failure and premature death (5).

Compliance with restrictions on fluid intake depends on the patient's ability to choose and the efficiency of self-care strategies (6). Patients who are confident in their self-care capabilities can better control their fluids intake. One

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effective method to observe treatment regimen is training (7). Training is a perfect tool to increase patients' awareness. Lack of adequate knowledge about self-care in the areas of diet, fluid intake and vascular care in this disease can cause various problems and will ultimately lead to various complications and death (8). Previous research show that educational intervention in patients treated with dialysis can be effective in reducing the patients' problems in terms of laboratory parameters and compliance with their diets (5, 7, 9-12). Teaching hemodialysis patients about their illness, medications, diet, etc. helps them in controlling disease symptoms and in following up treatment regimen (2).

Training is an important aspect of nursing activities. According to Bandura's self-efficacy theory, teaching self-care to patients undergoing dialysis can increase their compliance and self-care activities which lead to a reduction in complications and reduce health problems in these patients and improve their quality of life (13) . Nurse is the most important person in health care team in the area of treatment regimen compliance and follows up by patients. Hemodialysis patients need help to accept the changes in their lifestyle and in this area, nurses must help them understand their disease and gain independence in personal tasks (2). Creating innovative teaching methods in order to facilitate self-care for chronic patients is essential and nurses can develop and benefit from new cost-effective training methods. One of the innovative methods is that of teaching through electronic communication systems such as mobile phones (14). The growing development in the new millennium has led to advances in application if information and communication technologies in all areas, particularly in health. One of the most important devices used for this purpose is mobile phone which is increasingly used in telemedicine, health and disease control and health care (8). A key success factor is that of monitoring patients using a device that is available, the user is familiar with and requires no software training. Mobile phone and SMS have these features and need less skill compared to internet (14, 15) . Daily SMS is useful in increasing self-care, self-efficacy, treatment adherence and greater satisfaction among participants. In a study in New Zealand on young smokers, participants who received text messaging (SMS) based interventions within 6 weeks on hazards of smoking had a better participation and interest in smoking withdrawal cessation and programs (16).

Due to the increase in the number of hemodialysis patients and the long and stressful treatment process and given these patients' role in the treatment, their distribution in different locations, and high costs of face to face training, distance training methods can be considered as effective, affordable and simple methods to train these patients.

Considering the weight control of hemodialysis patients, researchers decided to carry out a study on the impact of training with follow up via text messaging on the weight control of hemodialysis patients referring to the dialysis department of hospitals affiliated with Tehran University of Medical Sciences.

## MATERIALS AND METHODS

This study is a clinical trial with IRCT2015012520798N1 RCT register number. The study population included all hemodialysis patients referring to the dialysis department of hospitals affiliated with Tehran University of Medical Sciences (Shariati, Amir Alam and Emam Khomeini Hospitals) in 2012. The necessary ethical approval and permissions were received from research ethical committees of Tehran University of Medical Sciences, nursing and midwifery faculty and all 3 hospitals. Inclusion criteria included consent to participate in the study, diagnosis with CRF as confirmed by the physician, age between 18 and 65 years as well as being literate, having a mobile phone and being able to use it to read text message and not having psychological illnesses. From those who will be selected the ones who have uncontrolled mellitus diabetes, uncontrolled hypertension, liver cirrhosis, congestive heart failure will be excluded.

The sample size was calculated with a confidence level of 1.64, test power of 0.80, error level of 0.01. A total of 70 qualified patients were recruited via convenience sampling. The main author presented in all dialysis units and after obtaining informed consent from the available patients who met the inclusion criteria, the subjects were provided with information about research objectives, training sessions and cell phone use, then they were randomly assigned to two groups of 35 persons (training and SMS follow-up).

The data collection instrument for this study was a questionnaire consisting of four parts. The first part included demographic information (age, sex, educational level, marital status, employment status). The second part included items on history of renal transplantation, duration of dialysis, cause of dialysis, the number of dialysis per week and other diseases. Part three measured level of satisfaction with training and part four was the final weight checklist. To check the validity of the questionnaire and the booklet, face validity and content validity were determined. After a review of literature and references, the questionnaire and the training booklet were developed. Then they were sent to ten faculty members of Nursing and Midwifery School of Tehran University of Medical Sciences. Necessary modifications were made based on their comments. To determine the reliability, Cronbach's alpha was used to assess the internal consistency. In a pilot study, the questionnaires were administered to a group of twenty people from the target population. A Cronbach's alpha coefficient of 0.79 was obtained.

In the first session, before training, the weight checklists were completed by both groups ( $n = 70$ ). All patients' weights were measured using the same calibrated device on a specified time. Next, both groups participated in two common training sessions each 45 minutes with a two-week interval. After the sessions, patients' weights were measured under similar conditions and were recorded in the checklists. Next, the educational booklets on hemodialysis, drugs, complications, nutrition, fluid restriction, stress management, weight control and self-care were distributed among participants. In the SMS follow-up group, the patients received messages associated with self-care behaviors for weight control. the content of messages were similar to training sessions and the educational booklet contents which worked as reminders to patients for what they have learnt about adherence of therapeutic regimen, fluid and salt restriction, medicines, exercise, nutrition tips, Arteriovenous Fistula self cares, dialysis complications prevention. Six messages a week were sent for 6 weeks (a total 36 SMS). The researcher sent the text messages via hers personal cell phone. The messages were in Persian and had a maximum of 160 characters per message. Each message was given a number and it was ticked after delivery. In case more than two messages were not delivered, the reason was checked and resolved via phone call. In these cases a new number was specified or if the patient wished to discontinue, he/she was excluded. These kinds of problems were predicted so researchers increase sample size to 80 patients (with estimating of 12.5% loss). 10 patients quit the research due to not interested to continue (5 people), kidney transplant (3 people) and death (2 people), so at the end 70 patients stayed in research.

The content of messages was about the importance of patient compliance with treatment regimens, fluid restriction, dietary restrictions, exercise and the like. The subjects were reminded that they could ask about problems and issues through SMS. After 6 weeks, the patient's weights were measured under the mentioned conditions and were recorded on the checklists. The data collected from both groups were analyzed using SPSS20 via paired and independent t-test and chi-square.

## RESULTS

The 70 patients studied were assigned to two groups of SMS follow-up and training (each 35). The participants' age group was 41-65 years. The mean age of SMS follow-up was 45.4 years and that of face to face education was 42.48 years. 54.3 percent of the SMS follow-up group and 74.3 percent of the training group were male (Table 1).

**Table 1: Distribution of relative and absolute frequency of individual characteristics in two groups of hemodialysis patients.**

Characteristics	Training group		SMS follow-up group		Test
	Number	Percent	Number	Percent	
<b>Marital status</b>	Single	11	31.4%	15	42.9%
	Married	24	68.6%	20	57.1%
	Total	35	100%	35	100%
<b>Occupation</b>	Unemployed	7	20%	6	17.1%
	Employed	13	37.1%	16	45.7%
	Housewife	7	20%	5	14.3%
	Other	8	22.9%	8	22.9%
	Total	35	100%	35	100%
<b>Education</b>	Below diploma	23	65.7%	14	40%
	Diploma	8	22.9%	11	31.4%
	Academic	4	11.4%	7	20%
	Other	0	0%	3	8.6%
	total	35	100%	35	100%
<b>Dialysis duration</b>	Less than a year	14	40%	9	25.7%
	More than a year	21	60%	26	74.3%
	Total	35	100%	35	100%
<b>Cause of renal failure</b>	Diabetes	10	28.6%	8	22.9%
	Hypertension	12	34.3%	16	45.7%
	Lupus	1	2.9%	0	0%
	Glomerulonephritis	2	5.7%	3	8.6%
	Renal lithiasis	2	5.7%	0	0%
	Other	8	22.8%	8	22.9%
	Total	35	100%	35	100%
<b>Kidney transplant history</b>	Yes	30	85.7%	18	51.4%
	No	5	14.3%	17	48.6%
	Total	35	100%	35	100%
<b>Other diseases</b>	Yes	23	65.7%	26	74.3%
	No	12	34.3%	9	25.7%
	Total	35	100%	35	100%

Based on our findings, before the intervention, mean and SD of weight was  $65.96 \pm 14.06$  for training group and  $66.76 \pm 13.02$  for the SMS follow-up group. There was no significant difference between the mean weights of patients in the training and SMS follow-up groups before the intervention (Table 2).

**Table 2: Comparison of mean weight of the SMS follow-up and training groups before training and 2 and 6 weeks after training in dialysis patients studied**

group weight	Training group			SMS follow-up group		
	mean	SD	t-test	mean	SD	t-test
Weight before training	65.96	14.06	T=-5.340 Df=34 P<0.001 Sig	66.76	13.02	T=-5.891 Df=34 P<0.001 Sig
Weight two weeks after training	64.35	12.95		65.41	12.83	
Weight six weeks after training	66.76	16.97	T=.035 Df=34 P=.972 NSig	64.01	13.26	T=-4.377 Df=34 P<0.001 Sig

After all subjects participated in two common sessions and their weights were measured and recorded, the mean weights reduced to  $64.35 \pm 12.95$  in the training group and to  $65.41 \pm 12.83$  in the SMS follow-up group. Comparing the mean and SD of weight change before and after training between the two groups after 2 weeks of training showed a mean weight change of  $-1.61 \pm 2.61$  ( $P < 0.001$ ) in the training group and  $-1.35 \pm 2.34$  ( $p < 0.001$ ) in the SMS follow-up, which indicated a significant difference between the two groups and the effects of training on weight control in dialysis patients (Tables 2 and 3).

**Table 3: Comparison of mean weight changes of the SMS follow-up and training groups before training and 2 and 6 weeks after training in dialysis patients studied**

group weight changes	Training group			SMS follow-up group		
	mean	SD	t-test	mean	SD	t-test
Weight before training with Weight two weeks after training	-1.614	2.61	T=-5.340 Df=34 P<0.001 Sig	-1.35	2.34	T=-5.891 Df=34 P<0.001 Sig
Weight before training with Weight six weeks after training	0.81	1.06	T=.035 Df=34 P=.972 NSig	-2.740	1.62	T=-4.377 Df=34 P<0.001 Sig

After follow-up and re-measuring weights for all patients, the mean and SD of weight after 6 weeks of training increased to  $66.67 \pm 16.97$  for the training group and decreased to  $64.01 \pm 13.26$  for the SMS follow-up group. Comparison of the mean and SD of weight change before and after 6 weeks of training showed that the mean and SD of weight change were  $0.81 \pm 1.06$  ( $p = 0.972$ ) for the training group and  $-2.74 \pm 1.62$  ( $P < 0.001$ ) for the SMS follow-up, which indicates a significant decrease in weight changes in hemodialysis patients in the SMS follow-up group (Tables 2 and 3).

80% of patients in the SMS follow-up group reported that this method of follow-up reminded them of the subjects learned during the two sessions and encouraged them to apply them. 49.9% of the patients had full satisfaction, 48.6% had average satisfaction and 1.5% had low satisfaction with the method. Reasons for dissatisfaction included lack of time to read messages and boredom when deciding to implement them.

## DISCUSSION

There was no significant difference between the training and SMS follow-up groups before the intervention. The results showed that training led to better weight control in both groups of patients as shown in the comparison between before and 2 weeks after the training. Tsay et al concluded in their study that for continuous and active participation in self-efficacy activities, dialysis patients need continuing education on self-care and on coping with illness which reduce their physical and psychological problems(17). Aliasgharpoor et al found that education contributed to weight loss and increased self-efficacy in patients undergoing hemodialysis. He recommended the training method to dialysis nurses (18). Studies found that only 20% of the subjects had normal weight gain and about 80% had above-normal weight gain between dialysis sessions (6, 7, 10, 18). In another study, the mean weight

gain between dialysis sessions during a month after training decreased which is consistent with our results (19). A study conducted in Tehran by Baraz et al showed that training programs can cause a significant decrease in the amount of urea, uric acid, P, Potassium and weight gain during two dialysis sessions (20). Durose et al also found that education on diet and fluid intake restrictions led to weight loss (21). All of these results are consistent with those of the present study.

The mean weight changes after 6 weeks in the SMS follow-up group was significantly less than the group with no SMS follow-up. Welch et al concluded that following up dialysis patients can lead to better compliance with diet and fluid restriction. These show the importance of follow-up measures in this group of patients (9). Baraz et al showed that self-efficacy training for dialysis patients done via video programs was effective in reducing problems and improving the quality of life for these patients. This confirms the effects of distance training (20). The results of a study on patients undergoing dialysis showed that the mean daily gain of 2.04 kg in the initial phase of study reduced to 1.79 kg per day in intervention phase and 1.87 kg in the follow-up phase. After the intervention, weight gain was kept at a low level during 4 weeks (10). This is in line with the results of the present study.

Using mobile phones particularly SMS service for providing information and medical services for patients can promote their self-care behaviors (11). Gallar et al conducted a study in Spain on "Telemedicine and follow up of peritoneal dialysis patients", during which the nurse controlled hypertension, edema, medications, catheter, and the amount of fluid intake in patients by video conference placed in the patient's home. This study confirms the positive effect of follow up of these patients which is consistent with our study (12).

Free et al, in a study of on smokers who wanted to quit, showed that sending warning SMS to encourage participants to quit smoking for 6 weeks was effective and the method was recommended as an effective follow-up method (22). Franklin et al in a similar study on 126 English adolescents with type 1 diabetes showed that text messages containing information about the daily diet, insulin therapy, exercise, etc. result in better self-efficacy and adherence. This is consistent with findings of the present study. They recommended the method for other chronic patients as well (23).

While the results indicate the positive impacts of training with SMS follow-up on weight control in hemodialysis patients, there are some drawbacks toward this method, some patients were concerned about privacy and confidentiality of their names and problem. In addition, the possibility that messages sent were not read or were ignored by the subjects was among limitations of the present study. The researchers tried to explain the goals of the study to participants to encourage them to pay attention to the messages.

This study suggests the effects of SMS follow-up on enhancing self-efficacy in weight management in these patients. Therefore, the main hypothesis "training and SMS follow-up significantly improves weight control in patients undergoing hemodialysis in Hospitals affiliated with Tehran University of Medical Sciences" was accepted. Further studies are recommended to investigate the impact of educational interventions and follow-up via SMS in other chronic diseases and in different situations and during longer periods.

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