RESEARCH ARTICLE

Educational interventions for improved diet and fluid management in haemodialysis patients: An interventional study

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Abstract

Objective: To evaluate the effect of education provided by the nurse on the knowledge and behaviours of haemodialysis patients about dietary and fluid restrictions.

Methods: This quasi-experimental study was conducted at five publicly funded dialysis centres located in Istanbul Province, Turkey, in 2014, and comprised dialysis patients and controls. Data was collected using the Scale for Dietary Knowledge in Haemodialysis Patients and the Scale for Dietary Behaviours in Haemodialysis Patients. The dietary education was given to the intervention group. SPSS 20 was used for data analysis.

Results: Of the 80 patients, there were 40(50%) in each group. The overall mean age was 64.12±55.50 years, and 42(52.5 %) of the participants were male. After the education provided to the intervention group, the dietary knowledge and behaviours' post-test scores significantly increased compared to the pre-test scores, and the serum sodium level, pre-dialysis weight gain and diastolic blood pressure significantly decreased ($p<0.05$ each). Between the intervention and control groups, a significant difference was found between the pre-test and post-test in serum sodium levels ($p<0.05$).

Conclusion: The education provided by the nurse had a positive effect on the knowledge and behaviour of haemodialysis patients about dietary and fluid restrictions.

Keywords: Haemodialysis, Nutrition, Knowledge, Behaviour, Nurse. (JPMA 68: 532; 2018)

Introduction

Haemodialysis (HD) is one of the replacement therapies for patients with end-stage renal disease (ESRD). Regular dialysis therapy ensures the removal of water from the metabolism of fluid (interdialytic weight) or foods ingested by the patients between two dialysis sessions through ultrafiltration (UF). The dietary prescription also reduces symptoms and prevents premature morbidity/mortality.[1] Another study reported that the patients with a good level of dietary knowledge had fewer problems and that such patients had better compliance and better well-being.[2] Previous studies have reported that methods such as patient education and self-monitoring effectively ensure the compliance of haemodialysis patients with dietary and fluid restrictions.[3,4]

Once the haemodialysis treatment is started, a number of changes occur in the patient's life.[5] For example, dietary restrictions are the most important issue in these patients and lack of adherence to dietary restrictions among haemodialysis patients is common. Patients look for a way to change their knowledge and attitude when it comes to dietary changes in nutrition.[6] In the literature, it is mentioned that information is significant to make changes in patients' lifestyles and the patients cannot make behavioural changes for diet, drug use and compliance to treatment in case of insufficient information.[7] It is known that, via the education provided to the patient, attention and cognitive functions are affected positively; thus, self-management and behaviours are motivated positively. First, patients should be informed of following the diet and the fluid restriction. Later, in the long term, patients should be encouraged to follow that diet.[6]

Nurses collaborate with dieticians' specialist to facilitate dietary and fluid prescription self-management using educational materials that include brochures, fact sheets, lists of foods to avoid, referral to Internet sites, and ongoing counselling.[1] It is important for nurses to develop a patient-specific method of dietary and fluid management to encourage compliance and improve the quality of life of patients.[8]

The current study was conducted to evaluate the effect of education provided by the nurse on the knowledge and behaviour of haemodialysis patients about dietary and fluid restrictions.

Patients and Methods

This quasi-experimental study was conducted at five publicly-funded dialysis centres located in Istanbul

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Province, Turkey, in 2014, and comprised dialysis patients and controls. The prevalence of dietary and fluid non-adherence varies widely (20-80%) across different populations and cultural backgrounds.[9] To find a difference with 80% theoretical power and with reliability of 95%, the minimum sample size was determined to be 76 subjects. Data from the dialysis centres with equal number of patients in each group were obtained. The dialysis session was started by creating a random number table. Patients undergoing haemodialysis therapy for at least six months or more, aged between 18-65 years, who were literate and agreed to participate in the study were included.

The socio-demographic data was obtained through the patient introduction form (age, education level, economic status, primary kidney disease, and urination and daily fluid consumption). The Scale for Dietary Knowledge in Haemodialysis Patients (SDKHP), and the Scale for Dietary Behaviours in Haemodialysis Patients (SDBHP) were developed in Turkish by Bulantekin Duzalan and Cinar Pakyuz (2014).[10] The literature does not contain a valid and reliable measurement tool to assess the knowledge and behaviours of the haemodialysis patients regarding dietary and fluid management according to Turkish culture. At the first stage of SDKHP and SDBHP, which is developed to measure the knowledge, behaviours and attitudes of chronic haemodialysis patients about dietary and fluid restriction, a question pool was formed in line with the information in the literature review,[8,11,12] interviews and the knowledge and experiences of the researchers. SDKHP was developed as a three-point Likert scale with response options being true, false, and I don't know.

The scoring was as follows: True: "1" point; False: "0" points; and I don't know: "0" points. The lowest and highest scores were 0 and 18 points, respectively. The scale consisted of a single sub-dimension and there was one reverse-scored item (12th item). The scale did not contain a cut-off score and the interpretation was "a good level of knowledge" for higher scores. Cronbach's alpha (α) reliability coefficient of the scale was 0.86. (Examples of items: "Legumes, meat, milk, and milk products contain high levels of protein","Foods such as pickles and canned products contain high levels of salt", "A diet with low potassium will help protect the heart health","If the dietary amount of protein is not well adjusted, I will be undernourished", etc).[10]

SDBHP was developed as a five-point Likert scale with these options: "strongly disagree, disagree, not sure, agree, and strongly agree", ranging from 1 to 5 points, respectively. The scale consisted of a single sub-dimension and there were no reverse-scored items. The lowest and highest scores were 13 and 65 points, respectively. The scale did not contain a cut-off score and the interpretation was "a good behavioural status" for higher scores. The Cronbach's α reliability coefficient of the scale was 0.73. (Examples of items: "I always comply with my diet", "When I feel good, I don't restrict salt", "I prefer fish and chicken to red meat for my health", etc).[10] Before starting the research, a pilot study was conducted comprising 20 haemodialysis patients.

Education was given in a face-to-face meeting in the haemodialysis centre. The patients having dialysis sessions three times a week were included in the intervention and control groups. The patients in the experiment group were selected the from Monday-Wednesday-Friday sessions. The patients in the control group are selected from the Tuesday-Thursday-Saturday sessions. In the first meeting with the experiment groups' patients which was carried out in the dialysis centres, the patient diagnosis form and SDKHP as well as the SDBHP were filled out. Patients' vital signs, weight before and after dialysis session and body mass index (BMI) were evaluated and written down on the form. Education content was designated by nutrition in haemodialysis, the importance of protein-phosphor and salt-restricted diet and fluid restriction and significant points to be taken into consideration in nutrition by the dialysis patients in renal diseases. The education sessions lasted for 30 to 45 minutes. At the end of the session, the education material and an appointment for 1 month later were given to the patient. In the second meeting, the vital signs, weight before and after the dialysis session and BMI of the patients were written down on the patient evaluation chart. Laboratory findings taken from the patient folder were also written down on this chart. The SDKHP and SDBHP were also filled out again.

Ethical approval was obtained from the ethics committee of the Marmara University, Istanbul, Turkey. The necessary institutional approvals from the respective dialysis centres were obtained. Before data collection, all participants gave written and informed consent. Additionally, the patients completed the 'Patient Information and Consent Form' which was prepared by the investigator.

The data was entered and evaluated using SPSS 20. The patients' descriptive characteristics were assessed as percentage and mean ± standard deviation (SD), Mann-Whitney U test and Wilcoxon test. To compare the two groups' SDKHP and SDBHP performances, we used Mann-Whitney U test; intra groups Wilcoxon test; pre-test and post-test intra groups differences in terms of blood

biochemistry Wilcoxon test.

Results

Of the 80 patients, there were 40(50%) in each group. The overall mean age was 64.12±55.50 years, and 42(52.5%) of the participants were male. Moreover, 37(47.3%) participants were primary school graduates and 24(30%) were literate. The mean daily urine volume was 183.87±122.18 ml and the mean daily fluid consumption was 1019.80±475.33 ml.

When the SDKHP and SDBHP pre-test and post-test scores were compared, the pre-education SDKHP and SDBHP scores increased after education in the intervention group and this difference was statistically significant ($p<0.001$ and $p<0.001$). In the control group, post-test SDKHP and SDBHP scores significantly decreased compared to pre-test scores ($p<0.05$ and $p<0.001$). Accordingly, there was a significant increase in the SDKHP and SDBHP post-test scores in the intervention group compared with the pre-test scores.

In the pre-test and post-test, there was no statistically significant difference in the SDKHP scores between the intervention and control groups ($p>0.05$), whereas there was a significant difference in the post-test ($p<0.001$). In the pre-test and post-test, there was a statistically significant difference in the SDBHP scores between the intervention and control groups ($p<0.01$ and $p<0.01$). The control group had significantly higher SDKHP scores

Table-1: Pre-test and Post-test Intra and Inter Groups Differences in SDKHP and SDBHP.

	Intervention Group (n=40) Median	Control Group (n=40) Median	Inter-Groups Differences Mann-Whitney U	
SDKHP (Pre-test)	8 (3.45)	10(3.7)	636	0.112
SDKHP (Post-test)	14 (3.68)	9(4.1)	389	<0.001
Intra-Group Differences Significance Wilcoxon test z and p	-5.194 <0.001	-2.071 <0.001		
SDBHP (Pre-test)	48.5 (5.8)	54 (6.9)	473.5	<0.001
SDBHP (Post-test)	55 (5.9)	52 (6.6)	462.5	<0.001
Intra-Group Differences Significance Wilcoxon test z and p	-4.477 <0.001	-3.701 <0.001		

SDKHP: Scale for Dietary Knowledge in Haemodialysis Patients.
SDBHP: Scale for Dietary Behaviours in Haemodialysis Patients.

Table-2: Pre-test and Post-test Intra Groups Differences in terms of Blood Biochemistry Means of the Intervention and Control Groups.

		Pre-test Median	Post-test Median	Inter-Groups Differences Significance Wilcoxon test z and p	
Albumin	Intervention Group	4.2 (0.46)	4.1 (0.38)	-1.19	0.235
	Control Group	4.10 (0.34)	4.1(0.29)	-0.71	0.480
Serum Total Protein	Intervention Group	7 (0.6)	6.6 (0.56)	-0.80	0.426
	Control Group	6.8(1.1)	6.6 (1.09)	-0.223	<0.05
Serum Na	Intervention Group	140 (3.41)	137 (2.54)	-3.45	<0.001
	Control Group	140 (2.95)	139 (2.63)	-0.91	0.11
Serum K	Intervention Group	5.28 (0.65)	5.19(0.56)	-0.42	0.673
	Control Group	5.22 (0.49)	5.19(0.44)	-1.6	0.110
Serum P	Intervention Group	5.4 (1.04)	5.28 (1.27)	-1.12	0.262
	Control Group	5.3 (1.26)	5.42 (1.19)	-1.64	0.101
Pre-dialysis Weight	Intervention Group	73.7 (13.7)	72.7 (13.4)	-1.32	<0.001
	Control Group	72.4 (12.5)	73.2 (12.5)	-2.97	<0.001

Na: Sodium
K: Potassium
P: Phosphorus.

compared to the intervention group in the pre-test, whereas the intervention group had significantly higher SDBHP scores compared to the control group in the post-test. Accordingly, there was a significant increase in the SDKHP and SDBHP pre-test and post-test scores in the intervention group compared to the control group (Table-1).

In the intervention group, there was no significant difference in serum levels of albumin, total protein, potassium, phosphorus, and urea between the pre-test and post-test results ($p>0.05$), whereas a significant difference was found in sodium levels ($p<0.01$). In the control group, there was no significant difference in serum levels of albumin, sodium, potassium, phosphorus and urea between the pre-test and post-test results ($p>0.05$), whereas a significant difference was found in total protein levels ($p<0.05$).

In the intervention group, there was no significant difference between the pre-test and post-test in the ultrafiltration (UF) amount, pre-dialysis systolic blood pressure (SBP) and diastolic blood pressure (DBP), post-dialysis SBP and BMI ($p>.05$), whereas a significant difference was found between the pre-test and post-test in pre-dialysis weight and DBP ($p<0.01$ and $p<0.05$). Compared to the pre-test results, the higher pre-dialysis weight and DBP of the intervention group decreased in the post-test. In the intervention group, there was a positively significant correlation between the years of haemodialysis and the SDKHP and SDBHP pre-test scores ($p<0.000$ and $p<0.05$).

In the control group, there was no significant difference between the pre-test and post-test in the mean UF amount, and pre- and post-dialysis DBP ($p>0.05$), whereas a significant difference was found in mean pre- and post-dialysis SBP ($p<0.05$). Compared to the pre-test, the pre-dialysis weight in the control group increased and the pre-dialysis and post-dialysis SBP was reduced in the post-test.

Between the intervention and control groups, there was no significant difference between the pre-test and post-test in the UF amount, SBP and DBP, post-dialysis SBP, and BMI, pre-dialysis weight, serum levels of albumin, total protein, potassium, phosphorus, and urea ($p>0.05$), whereas a significant difference was found between the pre-test and post-test in serum sodium levels ($p<0.05$) (Table-2).

Discussion

The dietary knowledge scores of the intervention and control groups were similar in the pre-test, whereas the dietary behaviour scores of the control group were better. The dietary behaviours of the intervention group were better than the control group in the post-test. Accordingly, the knowledge and behaviours of the intervention group positively improved after the education provided to the intervention group regarding diet and fluid control by the nurse.

In the studies by Moonaghi et al. and Hasanzadeh et al., half of the patients were provided with face-to-face training and the other half was provided with video-conference training regarding dietary and fluid restriction, and the assessment of the efficacy of the education after weeks 2 and 4 revealed a statistically significant improvement in patients' compliance levels with both methods.[13,14] In a study by Baraz et al., 32 patients were provided with face-to-face education and 32 patients were provided with video-conference education. They reported improved patient compliance with diet and fluid regimen after both trainings. In all three studies, there was no statistical difference between face-to-face and video-conference education.[15] Another study showed that the level of knowledge of chronic renal failure (CRF) patients increased by 60% to 66% after face-to-face training, suggesting that education is required for compliance and disease management.[7] In another study, a haemodialysis knowledge survey was administered before and after education in a face-to-face education programme and the knowledge scores of the patients increased after education.[7,14] Meta-analysis studies were reported that educational intervention had been effective in pre-dialysis and dialysis care.[16,17] Accordingly, positive outcomes were achieved regardless of the material used in the education provided to the haemodialysis patients.

The present study found no changes in serum levels of albumin, total protein, potassium, phosphorus and urea, and reduced level of sodium and pre-dialysis weight in the post-test compared to pre-test in the intervention group. In the control group, the serum levels of albumin, sodium, potassium, phosphorus and urea did not change, and the level of total protein decreased in the post-test compared to the pre-test. Although a significant reduction was achieved in the serum levels of sodium following education in the intervention group, there was a reduction in the serum levels of sodium in the control group.

In Turkey, the daily salt consumption is 17.5g in healthy individuals and the recommended salt amount is 6g. The required salt intake is 2g in dialysis patients.[18] A study that was conducted with face-to-face and video-conference education found low sodium levels following education; however, this difference was not statistically significant.[15]

A study that was conducted with 79 haemodialysis patients reported improved dietary compliance with low levels of dietary salt intake.[19] Additionally, a study that was conducted with 82 haemodialysis patients reported better levels of sodium, potassium and phosphorus in patients with good level of dietary knowledge than the patients who were non-compliant with fluid restriction.[20] Reduced sodium levels and its statistical significance are important findings for the present study. Because this result was good, especially for decreasing potential complications such as hypertension and increased volume in haemodialysis patients.[21]

In thestudies by Kurt andArikandWalshandLehane, haemodialysis patients were provided with education about water and salt restriction for 2 weeks, and a marked reduction was found in water and salt intake after the education.[19,22] Fluid retention may cause adverse conditions such as oedema of the lower extremities, pulmonary congestion, oedema, hypertension and heart failure. Therefore, fluid management emerges as an important topic in ESRD patients.[23]

In the current study, there was a statistically significant reduction in pre-dialysis weight in the intervention group, whereas there was increased pre-dialysis weight in the control group in the post-test. Accordingly, body weight control could be achieved in the intervention group due to the education given by the nurse.[24] In a study that was conducted with 22 haemodialysis patients, education incorporating cognitive behavioural therapy (CBT) was provided regarding dietary salt intake and body weight decreased in patients complying with salt restriction and weight-gain which was statistically significant.[25] In another study of 67 male and 33 female patients, after education, there was a significant reduction in pre-dialysis weight means ($p<0.001$).[26] This finding may be interpreted as an important outcome of the education provided to the patient to achieve weight gain and salt control.

In the present study, a significant reduction could not be achieved in SBP after the education provided by the nurse in the intervention group, but DBP significantly decreased. The literature contains studies supporting the present study, as well as studies reporting different findings. In the study by Kauric-Klein, the intervention group patients were provided with education on salt use and blood pressure control, and no difference was found in SBP between the intervention and control groups after 12 weeks, whereas DBP was higher in the control group; there was a statistically significant difference between the two groups.[27] In the studies by Barnett et al. and Kurt and Arik, haemodialysis patients were provided with education and water and salt restriction, and a significant reduction was achieved in mean SBP following education compared to the pre-education levels, whereas there was no change in DBP.[3,22]

The knowledge level and behaviours of the patients about the disease and the treatment plan can be affected by socio-demographic characteristics and beliefs.[28] The present study found improved compliance with knowledge and behaviour with increasing age of the patients. The study by Lam et al. reported better compliance with treatment and diet in patients with 1-to 3 years of dialysis compared to those with less than 1 year.[29] The study by Balaga showed improved dietary compliance with increasing years of dialysis.[30] The study by Khalil and Darawad reported that non-compliance with fluid and dietary restrictions increased with increasing years of dialysis, contrary to the findings of the present study.[9] Improved compliance of the patients with the disease over time is an important step in improving the quality of life.

Conclusion

The knowledge level of haemodialysis patients regarding dietary and fluid restrictions was lower and their behaviours were non-compliant prior to education. After the education provided by the nurse, the knowledge level about dietary and fluid restrictions increased and the behaviours improved.

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