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The effect of an Educative Intervention about Blood Pressure Control on levels of Knowledge and Self Efficacy in Patients Undergoing Hemodialysis: A Randomized Clinical Trial

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ABSTRACT

Statistics show that hypertension is a common co-morbidity amongst hemodialysis patients. Knowledge and self-efficacy levels of the patient can affect health-related behaviors in managing the disease as well as the consequences of the disease. This study was conducted to elicit the effect of an education intervention on the knowledge and self-efficacy of hemodialysis patients in terms of blood pressure control. In a randomized clinical trial, 58 patients undergoing hemodialysis were randomized into an intervention (n=29) or a control group (n=29). Questionnaires were utilized to gather data relating to sample demography and levels of knowledge and self efficacy about blood pressure control in hemodialysis patients. The Intervention group received education and at the end, the educating manual was delivered to patients. Then, it was tracked once a week by the researcher. After 12 weeks, knowledge and self-efficacy were measured in both groups again. The results showed that there was a significant difference between the mean scores of knowledge before educating (35.24 ± 4.35) with 12 weeks after educating (39.58 ± 4.22) among the patients participating in the intervention group ($p < 0.001$). The findings also indicated that, there was a significant difference between average self-efficacy scores before educating (44.99 ± 3.79) with 12 weeks after educating (48.9 ± 3.79) among patients in the intervention group ($p=0.001$). This study results showed that, nursing education along with follow-up in patients undergoing hemodialysis is effective on promotion of knowledge and self-efficacy in these patients is in controlling blood pressure. Due to the effectiveness and cost-effectiveness, this method is recommended for patients undergoing hemodialysis.

Key words: knowledge, self-efficacy, education, hemodialysis

INTRODUCTION

Kidney failure is one of the most common diseases of contemporary society, affecting 2 to 3 percent of people worldwide. By 2030 it is estimated that nearly 70% of global deaths will be due to this chronic disease [1]. The most prominent event that 21st century health care staff and communities are facing is chronic diseases [2]. In particular, chronic renal failure, which has a slow and chronic start, culminates in renal insufficiency and the need for invasive therapies to maintain renal function [3]. According to 2015 statistics from the Association of Dialysis in Iran, the prevalence of kidney failure in the world is 141 people per million, and approximately 8% added to this figure annually. Globally, the number of patients in ESRD at the end of 2014 was estimated at approximately 3,346,000 persons. The annual global growth rate of ESRD is almost 5-6 percent, compared to the annual population growth (1.1 percent). These figures illustrate that this disease is one of the main treatment problems in all countries in the world. From a global perspective, at the end of 2014, the world 2,358,000 people underwent hemodialysis, compared to 304,000 people undergoing peritoneal dialysis. Transplants were carried out on around 684,000 people. In March 2014, the number of dialysis patients in Iran was estimated at 27,457 people, with 94% (n=2,593) treated by hemodialysis [4].

Each year about 1,500 (10%) patients with chronic renal failure die as a consequence of complications of the disease [5].

High blood pressure is a common risk factor for cardiovascular disease in patients with chronic renal failure. Despite medical intervention controlling high blood pressure, especially in patients with chronic renal failure is difficult [6]. ESRD increases the risk of cardiovascular disease up to 10 fold compared with the general population [7]. Consequently, the prevalence of hypertension in patients undergoing hemodialysis and peritoneal dialysis is high. Hypertension in patients on dialysis may lead to left ventricular hypertrophy and heart failure and may increase the risk of stroke in these patients [8]. Therefore, like the general population, hypertension in patients with ESRD should be treated. Anemia and high blood pressure in this patient group increases the workload placed on the heart, which lead to atherosclerosis and left ventricular hypertrophy [9].

Agarwal *et al.*, identified possible reasons for uncontrolled hypertension in patients undergoing hemodialysis. These included poor self-care and nutrition, such as high fluid and salt intake, which leads to extra weight gain. Also, patients' preference to use the previous routine medication; non-adherence to medication regimens for blood pressure; and forgetting or omitting hemodialysis treatments [10]. Optimal use of antihypertensive medications; increased attention to non-pharmaceutical interventions such as dry weight; reducing salt intake and controlling intravascular volume can all improve blood pressure control in the treatment of heart failure and pulmonary edema [11]. According to the National Kidney Foundation guidelines (2005K/DOQI¹), in order to control blood pressure, patients undergoing haemodialysis should adhere to strict management of fluid intake and concordance with antihypertensive regulation medication regimens.

Non-observance of dietary restrictions relative to hemodialysis has a negative effect on interdialytic weight gain (IDWG) and subsequently leads to increased blood pressure in patients on hemodialysis [12]. Knowledge is essential for change and if the patients are not aware of effects of diet and adherence to medication, then they will have little motivation to change their behavior [13]. Many studies have suggested poor adherence to treatment due to lack of knowledge, and research studies have shown that many people with advanced kidney disease lack knowledge and understanding of the dietary requirements of their disease, resulting in poor management of diet and health [14].

One of the most important factors in improving the quality of life for patients undergoing hemodialysis is self-efficacy, which is the person's ability to perform self-care behaviors in certain circumstances [15].

Studies show that people who are confident of their abilities participate more actively in health plans promoting their health [16]. By encouraging and educating patients specifically about the importance of hemodialysis, nurses can help the patient to contribute positively to their own care needs [17]. Studies have shown that blood pressure control in patients undergoing hemodialysis needs patient-centered intervention, determined by the active participation of patients, willing to accept personal responsibility and willing to make changes to individual lifestyle [1].

¹Clinical Practice Guidelines for Cardiovascular Disease in Dialysis Patients

Correlational studies demonstrated that an increase in self-efficacy was related to adherence to treatment; improving health behaviors; and decreasing physical and psychological symptoms. They also revealed that the inability to adapt to the disease may lead to negative consequences of non-compliance with treatment [18].

There is limited published research related to the effect of education in enhancing knowledge and self-efficacy about blood pressure control in this patient group. Given the importance of education, our study was undertaken to address this gap in knowledge by examining the impact of education in this regard, and to determine if the impact would offer a convenient and practical way to improve blood pressure control in hemodialysis patients thereby reducing complications. Therefore, the aim of this study was to investigate the effect of an educative intervention on levels of knowledge and self-efficacy in hemodialysis patients about blood pressure control. The current efforts is pharmacological treatment to improve the blood pressure control, this study attempts to investigate non pharmacological approaches (education) to control the blood pressure.

MATERIALS AND METHODS

Study method

The approach taken for this study was a randomised clinical trial. Approval and confirmation of the validity and reliability of the questionnaires was obtained. Permission was obtained from the Committee of Research Center School of Nursing and Midwifery, Tabriz and ethical approval (No. 12, 20, 2014- 5/4/8981) from the regional research ethics in research of University of Medical Sciences Tabriz. In addition, the study was registered in clinical trials center (N201471618503 IRCT) and the researcher referred to Sina Hospital, Tabriz for the preparation of samples of hemodialysis patients. The study population was the patients undergoing hemodialysis in Hemodialysis Ward of Sina hospital in Tabriz in 2014-2015. Availability sampling was utilised in this study and 58 patients were recruited from the total population of 110 patients. The sample were randomly assigned to either the control group (n=29) or the intervention group (n=29). Inclusion criteria was: cognitive ability to consent to participate in the study; have been undergoing haemodialysis for at least 6 months; aged 18 years old or over; have maintained a systolic blood pressure of above 140 mmhg or diastolic blood pressure of above 90 mmhg before hemodialysis for at least 4 weeks. To prevent the exchange of information between the two groups, the educational intervention was offered to the two groups on alternate days.

The data collection tool utilised in this study consisted of three questionnaires. The first questionnaire gathered demographic information (age, sex, marital status, educational level, employment status, duration of hemodialysis and other conditions, the average blood pressure of the patient in the past four weeks); the second questionnaire was designed to elicit the patient's knowledge of blood pressure control. This second questionnaire was developed by Peters in 2007 to measure participants' knowledge of actions to be taken to control blood pressure. It consisted of seven items where higher score indicated greater knowledge levels by hemodialysis patients about the control of blood pressure[1]. The third tool was a questionnaire concerned with self-efficacy in blood pressure control in hemodialysis patients. It consisted of 11 items, designed to measure the confidence levels of participants in relation to their participation in self-care behaviors aimed at controlling blood pressure. This third questionnaire was developed by Bijl, Peoelgeest-Eeltink & Shortridge-Baggett in 1999 to measure self efficacy in patients with type 2 diabetes and was modified and used in 2010 by Zorica Kauric, where it was used to measure self-efficacy of blood pressure control in patients undergoing hemodialysis. Again, higher score indicated greater self-efficacy.

To measure the validity of the tools used in this study, content validity was undertaken. The questionnaires were given to ten members of the Faculty of Nursing and Midwifery, Tabriz, and after gathering their views on the tools amendments were made, which were based on the feedback obtained. The Knowledge and self-efficacy questionnaires were translated from English into Persian. For reliability, internal consistency (Cronbach's alpha) was used where the reliability for self-efficacy tool was $\alpha=0.83$ and $\alpha=0.79$ for the knowledge tool. Reliability of the knowledge tool, based on a similar study was kauric $\alpha=0.9$; and intra-reliability of the self-efficacy tool was $\alpha=0.81$ in Bijl 1999 and based on a similar study was as kauric $\alpha=0.78$.

Prior to the intervention, at the start of the study, the knowledge and self-efficacy levels of all participants (n=58) were measured using the questionnaires. Random assignment was based on random numbers table. The patients were asked to follow them. Following this, the educational intervention was given to the intervention group (n=29) by the researcher. The educational materials included information about the importance of hemodialysis sessions; dietary advise about limitations of intake of salt and fluids; the quality of blood pressure control; blood pressure symptoms

and the importance of medication use. This intervention was delivered to each patient in two sessions of 20 to 30 minutes in two successive shifts at the patient’s bedside .It was implemented during the initial stages of the hemodialysis session due to favorable patient conditions. At the end of the session, the educational booklet was given to the patients. Follow up was conducted on a weekly basis by the researcher. It was possible for Patients in the time between educational opportunities to ask questions and get answers from the researcher. A researcher involved in the hemodialysis sessions (of course, to prevent the exchange of information were intervention and control groups in separate days).

The control group (n=29) received the usual routine instructions and education and follow up was conducted once a week. After 12 weeks, knowledge and self-efficacy levels of the two groups were measured again using the previously used questionnaires.

Data were analyzed using SPSS version 16 and the significance level of all these tests was considered as P< 0.05 .

RESULTS AND DISCUSSION

In this study, 60 patients undergoing hemodialysis agreed to participate, but, two were excluded due to kidney transplantation. The sample of 58 was randomised into an intervention (n=29) or a control (n=29) group. In response to the first hypothesis, the results indicate the impact of education on knowledge of patients. In response to the second hypothesis, the results indicate the impact of education on self-efficacy of patients. Demographically, each group was as homogeneous as possible. The average age of patients in the intervention group was 57.48 years and 58 years in the control group. Males accounted for 51.72% (n=15) of the intervention group and 44.82% (n=13) in the control group. Participants who were married represented 79.32% (n=23) of the intervention group and 65.50 % (n=19) of the control group. Regarding education, 65.5 % (n=19) of participants in the intervention group had completed elementary education compared to 58.6 % (n=17) in control group. In relation to disposable income 65.5 % (n=19) of patients in the intervention group and 72/4% (n=21) of patients in the control group had less income to spend (See **Table 1** below).

Pre intervention, the mean and standard deviation (SD) of the participants levels of self-efficacy and knowledge were calculated using statistical paired t test. Results were 34.54 ± 4.95 (for self efficacy) and 45.23 ± 4.99 (for knowledge), with no significant difference in levels of self-efficacy and knowledge in the control and intervention group.

Table 1: Demographic Characteristics of participants

Statistical indicators of groups Demographic characteristics		Intervention group Frequency (percent)	control group Frequency (percent)	Intervention group M±SD	control group M±SD	sig
The mean age				57/48(12/74)	58(12/73)	0/746
Sex	Male	15(51/72%)	13(44/82%)			0/599
	female	14(48/27%)	16(55/17%)			
Marriage	Single	2(6/89)	5(17/25)			0/613
	Married	23(79/32)	19(65/50)			
	Divorced	4(13/79)	5(17/25)			
Education	Primary	19(65/5%)	17(58/6%)			0/61
	Guidance	4(13/79%)	5(41/4%)			
	Diploma	3(10/35%)	3(10/35%)			
	Collegiate	3(10/35%)	4(13/79%)			
Economy	Less income to spend	19(65/5%)	21(72/4%)			0/443
	Income=out	0(0/0%)	1(3/5%)			
	More income from spending	10(34/5%)	7(24/1%)			
Hemodilysis history (Month)				66/86(55/62)	78/72(70/74)	0/365
History of other diseases	Diabetic	13(44/8%)	13(44/8%)			
	Heart disease	4(13/8%)	4(13/8%)			
	Absence	12(41/4%)	12(41/4%)			

Post implementation of the educational sessions and subsequent follow-up at 12 weeks for the intervention group, the self-efficacy and knowledge questionnaires were redistributed to both groups and responses analysed and

measured. Results revealed that the mean and SD had increased to 37.26 ± 5.60 (for self efficacy) and 46.74 ± 3.98 (for knowledge). Self-efficacy and knowledge were measured as 39.57 ± 4.24 and 48.08 ± 2.81 for the control group (n=29) and as 34.95 ± 5.93 and 45.38 ± 4.54 for intervention group (n=29). The results of this study showed a significant increase in the average knowledge in the intervention groups ($P < 0.001$). In addition, after the educational intervention in the intervention group the mean of self-efficacy showed a significant increase ($p=0.00$).

The **table 2** shows the mean scores for levels of knowledge for both cohorts of participants.

Table 2: Comparison of pre and post intervention knowledge scores in the two cohorts

Group	Pre education		Post education			Paired t-test result
	Mean	Standard deviation	Mean	Standard deviation	Mean difference CI95%	
Intervention	35/24	4/35	39/58	4/22	-5/25±3/41	t=-9/665 df=28 p=0/00
Control	33/86	5/48	34/95	5/93	-2/03±0/175	t=-2/435 df=28 p=0/021
Mean difference CI95%	-1/38±1/13		-4/63±1/71			

According to the results and the significance level of less than 0.01 in the control group, it can be determined that there is a significant difference in the mean levels of knowledge before and after the intervention at 1% level and since the average obtained after intervention is higher than before, so with 99% probability, it can be said that knowledge has increased after the intervention. However, due to differences between the average obtained and that the difference in the intervention group is 4.34 and higher than control group with 1.9 so it can be said that education has been able to increase the knowledge of participants to a greater amount in the intervention group. **Table 3**

Table 3: Comparison of pre and post intervention self-efficacy scores in the intervention and control groups

Group	Pre education		Post education			Paired t-test result
	Mean	Standard deviation	Mean	Standard deviation	Mean difference CI95%	
Intervention	44/99	3/79	48/09	2/81	-2/16±4/02	t=6/806 df=28 p=0/001
control	45/48	6/02	45/38	4/54	-2/35±2/55	t=-0/086 df=28 p=0/932
Mean difference CI95%	-0/49±2/23		2/71±1/73			

A comparison of the scores of self-efficacy of the two groups pre and post intervention is presented in the table below. With regards to the results; in the control group, a significance level greater than 0.05, and a 95% confidence interval, shows that there is no significant difference at 5% level pre and post intervention. Regarding the results from the intervention group, the significance level higher than 0.01, shows that there is a significant difference between the pre and post intervention self efficacy scores since the average obtained after intervention is higher than before. It can therefore be that stated, with 99% probability, that self-efficacy has increased after the intervention.

DISCUSSION

The aim of this study was to investigate the effect of an educational intervention on levels of knowledge and self-efficacy about blood pressure control in patients undergoing hemodialysis. It was predicted that by offering educational interventions to these patients, self-efficacy abilities could be improved.

Results showed that introducing educational materials to the patients could have a positive impact on increasing levels of knowledge and self-efficacy. Findings also revealed that there was no statistically significant difference between patients in the intervention and control groups pre and post intervention, and that the two groups, in terms of age, gender, and other demographic characteristics were similar (**Table 1**). By comparing levels of knowledge pre and post intervention, the results showed an increase in knowledge in the intervention group, whilst in the control

group it had also increased slightly. As Aghakhaani and colleagues demonstrated in their study, improving knowledge enhanced the quality of life for the patient undergoing hemodialysis and that the professionals delivering the treatment should be knowledgeable about their patients dietary needs. Attention and consideration should be paid to this point as it has the potential to improve the quality of life for the patients [19]. The results of the study carried out by Imaani and colleagues showed that face to face patient education by the nurse which focuses on kidney function, dialysis, nutrition, diet, medication and proper activity can have a positive impact on the knowledge of patients undergoing hemodialysis[20]. In several studies, increasing

patient knowledge was determined to be the result of chronic kidney disease education to patients in clinical trials (13). However, in an intervention study conducted in 2011 by Kauric, no significant relationship was found after 12 weeks, between the knowledge of blood pressure of patients in the intervention group compared with the control group. In addition, no significant correlation was found between increased knowledge of hypertension and demographic information [21].

The studies have shown that as self-efficacy improved, the person is more able to take control of their situation and enhance their quality of life[22]. The results of this study were consistent with the results of the study by Ali Asgharpour and associates on the effect improved self-efficacy had on weight management in hemodialysis patients [23]. The study conducted by Tsay demonstrated that, education improved the self-efficacy for patients with chronic renal failure who were undergoing hemodialysis and increased their adherence to fluid restriction and reduction in weight gain between hemodialysis sessions. Tsay asserted that by improving self-efficacy, compliance and adherence to the treatment regimen may increase, thereby reducing the patient's physical and psychological symptoms[18].

CONCLUSION

The results from this study suggest a positive impact from education on levels of knowledge and self-efficacy in hemodialysis patients in relation to controlling blood pressure. Therefore, it is recommended that this group of patients are provided with more focussed and formal educational materials by nurses. It is believed that raising the levels of knowledge and self-efficacy in patients on hemodialysis will enhance their quality of life and reduce some of the associated problems.

Finally, as a consequence of this study, the following recommendations are made:

1. It is suggested that combining various methods of teaching and more face to face educational sessions be used for patients education
2. Future studies should be undertaken in the wider communities in hemodialysis patients, so that there is better chance of matching and achieving more generalized results.

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