Effect of Nursing Guideline on Dietary and Fluid Compliance among Patients Undergoing Hemodialysis

Fathia Ahmed Mersal

Assistant Professor of Community Health Nursing, Ain Shams University, Egypt

Dalia Salah El Deen El-Sedawy*

Lecturer of Medical Surgical Nursing, Cairo University, Egypt

Nahed Ahmed Mersal

Assistant Professor of Medical Surgical Nursing, Ain Shams University, Egypt

Abstract

Background: Patient compliance with the recommendations and treatments of healthcare providers is critical to the efficacy of those interventions. Unfortunately, poor patient compliance is a widespread problem in health care that carries with it substantial medical, social, and economic consequences, particularly among patients undergoing hemodialysis. Compliance to diet and fluid restrictions by adults on hemodialysis treatment is challenging. **Aim**: The aim of this study was to evaluate the effect of nursing guideline on dietary and fluid compliance among patients undergoing hemodialysis. **Methodology: A** quazi experimental design was utilized for conducting the study. A convenient sample of 60 adult patients on hemodialysis management at the Hemodialysis Department in El Manial University, Kasr Al-Aini hospital affiliated to Cairo University, Egypt, was recruited, and randomly divided into study and control groups (30 patients each). Data were collected through six tools; Socio-demographic and medical data sheet, Biochemical indicators data sheet, Knowledge assessment sheet, Attitudes towards dietary and fluid compliance sheet, Self-reported dietary and fluid compliance sheet and Food frequency sheet. **Results**: There were statistically significant improvement of knowledge; attitude and compliance regarding diet and fluid regimen in the study group after implementation of the nursing guideline when compared to the control group. **Conclusion**: A nursing guideline may improve the patient's knowledge regarding diet and fluid regimen as well as enhance dietary and fluid compliance among patients undergoing hemodialysis. **Recommendations:** It is suggested to apply this nursing guideline on the hemodialysis patients in their early course of treatment, and to replicate the study on a larger study sample in different settings to generalize the results.

Keywords: Nursing guideline, dietary and fluid compliance, hemodialysis.

1. Introduction

End stage Renal Disease (ESRD) has been emerged as a major public health problem around the world (Ibrahim, Darwish, Abed El-Rahaman, & Belal, 2009). In Egypt, the prevalence of ESRD is one of the highest disease in comparison to other countries. End Stage Renal Disease is a total or almost total permanent kidney failure. It is progressive and frequently irreversible decline in kidney function, which is ultimately fatal without the intervention of intermittent dialysis and/or kidney transplantation (Mohsen, Mohammed, Riad, & Atia, 2013).

Hemodialysis (HD) is a method that is used to achieve the extracorporeal removal of waste products such as creatinine and urea also free water from the blood when the kidneys are in a state of renal failure (Port, 2014). The HD cannot replace all the functions of the kidney, so fluid and dietary restrictions are important, and great compliance is required by the patients (Jawadagi, 2014). On the other hand, patients on hemodialysis require managing and compliance to a complex treatment regimen of dietary restrictions and fluid limitations. Compliance has been defined as "the extent to which a person's behavior corresponds with agreed recommendations from a health care provider including taking medication, following a diet, and fluid restrictions" (Ganiyu, Mabuza, Malete, Govender, & Ogunbanjo, 2013).

Patients with hemodialysis are required to follow a complicated treatment protocol that includes frequent HD sessions, severe dietary restrictions, a complex medication regimen, and exercise prescription. Failure to follow this regimen may result in short and long term consequences for health and survival. In short term, non-compliance to treatment regimens may increase the likelihood of emergency and hospital admissions. The development of additional co-morbidities, like cardiovascular disease, and mortality are potential long term consequences (Khalil & Frazier, 2010).

Jafari, Mobasheri, and Mirzaeian (2014) reported that poor diet and lack of fluid restriction can have serious consequences for patients, including impaired physical abilities, depression, acute pulmonary edema, congestive heart failure, and death. A poor dietary habit is associated with low quality of life, and morbidity and mortality of patients on dialysis. Further, malnutrition and inflammation increase cardiovascular risk and mortality in patients on hemodialysis.

Nursing guidelines mean systematically derived statements that help nurses to make decisions about care in specific clinical circumstances. These should be research or evidence based. Nursing guideline that promotes dietary compliance in HD patients is crucial to the wellbeing and survival of patients. Nurses are in an excellent position to assess and enhance compliance and to subsequently improve clinical outcomes. They have more face-to-face interactive time to reinforce the importance of compliance compared to other health care professionals (Kugler, Maeding, & Russell, 2011). Nurse's role is important to teach and facilitate patient's adoption to new life. Nurses can conduct nursing programs for HD patients that help patients better understand their renal disease condition; acquire self-care skills in order to improve compliance and quality of life (Mansour, Youssef, Salameh, & Yaseen, 2014).

1.1. Significance of The Study

According to the last accessible statistics in Egypt, the number of cases with renal failure was dramatically raised up to 300 cases per million citizens (Mahmoud, Selim, & Abdel Raouf, 2014). Moreover, it is well known that patients with renal failure are much susceptible to develop cardiac and respiratory disease. In spite that, the medical management either via prescribed medications or scheduled dialysis is vital for those patients' health; however, it is valuable to adjust their life style by controlling the fluid and dietary intake which is a major part of the nursing role. Specially, the compliance to the prescribed dietary regimen is a crucial factor in achieving desirable therapeutic results for patients on dialysis. Also it contributes the better outcomes as a vital co-factor by reducing morbidity, mortality, and the adverse effects of HD, such as muscle cramp, malnutrition, sepsis, and infection..etc. Based on the researchers' experience, it was observed that several patients on hemodialysis did not comply enough on the safe diet or the suitable amount of fluid, which definitely play a major factor in the developing of many complications as increase their daily suffering, by affecting their activity of daily living negatively, circulatory burden, pulmonary problems and increase cardiac workload as well. Thus, it was worth to teach those patients through a nursing guideline the compliance to dietary and fluid regimen.

1.2. Aim

The aim of this study was to evaluate the effect of nursing guideline on dietary and fluid compliance among patients undergoing hemodialysis**.**

1.3. Hypotheses

In order to accomplish the research aim the following hypotheses were suggested:

H1: The study group who receive nursing guideline will have significant higher mean knowledge scores than the control group who receive the routine care.

H2: The study group who receive nursing guideline will have significant positive attitude towards dietary and fluid compliance than the control group who receive the routine care.

H3: The study group who receive nursing guideline will have significant greater dietary and fluid compliance than the control group who receive the routine care.

2. Subject and Methods

2.1. Research Design

A quasi experimental design was utilized to accomplish this study.

2.2. Setting

The study was conducted at the Hemodialysis Department in El Manial University, Kasr Al-Aini hospital affiliated to Cairo University, Egypt.

2.3. Subjects

A convenient sample of patients was recruited for the study. The total sample size was calculated according to Epi Info program, 2008; as 240 patients, with an expected frequency of 30%, a worst acceptable frequency of 20%. The sample size equals 60 patients at 95% confidence level. A sample of 60 adult male and female patients was recruited according to the following inclusion criteria: (1) Patients on hemodialysis management for more than three months and less than one year, (2) They did not have compliance to dietary and fluid regimen according to the Food frequency sheet (food intake).

2.4. Tools for Data Collection

In order to achieve the objective of the current study, six tools were utilized. to ensure the content validity, a panel of 3 experts in the medical–surgical nursing college staff revised the tools in addition to a professor in community health nursing, and minor modifications were mentioned . The tools were as follows:

1.   Socio-demographic and medical data sheet: It contains data regarding the demographic profile such as;

age, gender, occupation, level of education, and family income. Medical data contain the history of the hemodialysis, frequency of hemodialysis per week, duration of dialysis session, blood pressure measurements and body mass index (BMI).

2. Biochemical indicators data sheet: It includes creatinine, phosphorus, sodium, potassium, and hemoglobin levels.

    Knowledge data sheet: it was designed by the researchers to measure the level of knowledge regarding hemodialysis dietary and fluid regimen, it contains 25 statements. The patients read it and have to check either true or false. The scoring system was (0) if the answer is wrong and (1) if the answer is right with the total grade of 25 and satisfactory level was 80% (20 grades). The reliability of the tool was done using Cronbach's alpha (0.864).

3. Attitudes towards dietary and fluid compliance: it was developed by Rushe and McGee (1998) to measure patients' attitudes towards dietary and fluid restrictions. The questionnaire consists of 26 items (with four Likert scale responses ranging from "strongly disagree, 1" to "strongly agree, 4"). Higher scores indicates more positive patient attitude towards dietary and fluid restrictions. The items from four subscales: 'attitude towards social restrictions (six items, $\alpha = 0.88$), 'attitudes towards wellbeing' (seven items, $\alpha = 0.77$), attitudes towards self-care/support (four items, $\alpha = 0.68$), and acceptance (nine items, $\alpha = 0.86$). The reliability of the whole tool was done using Cronbach's alpha (0.880). The tool was translated into 2 ways from English to Arabic and from Arabic to English to ensure accuracy.

4. Self-reported dietary and fluid compliance was developed by Rushe and McGee, (1998) to measure self-reported compliance. The questionnaire consists of 25 items (with five Likert scale responses ranging from "never, 1" to "always, 5") higher scores indicate greater compliance. Total score was 125 and compliance level was 70% (88 score). The tool was translated into 2 ways from English to Arabic and from Arabic to English to ensure accuracy. The reliability of the tool was done using Cronbach's alpha (0.766).

5. Food frequency sheet (food intake): it used to gather information on how often a specific category of food is eaten and amount of fluid intake. It was designed by the researchers and divided into 5 sections 4 out of 5 sections assess the frequency of food intake rich in protein (milk, egg, meat, chicken, liver, fish, and legumes), potassium (apricots, dates, mango, orange, banana, peaches, cantaloupe, dried fruit, raisins, artichokes, coconut, lentils, potatoes, tomatoes, dried beans and peas, coffee, chocolate, ice cream, black honey, and salt substitutes), sodium (soft drinks, pickles, smoked foods, mustard and ketchup, canned foods, and salty nuts), and phosphorus (soft drinks, fish, nuts, legumes, yogurt, chocolate, ice cream, meat, and milk) per week. The scale was used to measure the frequency of four food categories taken: (a) less than or three times per week (considered compliant); (b) more than three times per week (considered noncompliant). Regarding protein intake, because the patients need daily requirement of protein, the matchbox was used as a standard size for the allowed amount of daily protein intake for most of the food rich in protein, therefore, patients who take daily allowed amount (matchbox size) or take more than allowed amount per day for less than or 3 days per week were considered compliant, while patients who take more than daily allowed amount for more than 3 days per week considered non-compliant.

    The 5th section measures the amount of fluid intake, for fluids the scale was: (a) drink the allowed amount(calculated by the researchers) or more till 250 ml; (b) drink more than allowed amount by more than 250 ml. Regarding fluid regimen, a patient was considered compliant to fluid regimen if the patient drinks the allowed amount or drinks more than allowed amount for less than or equal 250 ml, for more than 3 days per week.

2.5. Ethical Considerations

An official permission was obtained from the Director of the Hemodialysis Department in which the study was conducted. Prior to conducting the study, each potential subject was informed with the purpose and nature of the study, and then an oral informed consent was taken from each participant. In addition, the researchers emphasized that participation in the study is entirely voluntary; anonymity and confidentiality were assured through coding of data, yet, withdrawal from the study is permitted at any time as it is one of their rights.

2.6. Pilot Study

 A pilot study was conducted on 10 patients at the Hemodialysis Unit, and these patients were excluded from the main study sample. The objectives of the pilot study were: (a) to estimate the time necessary to fill in the entire questionnaires and (b) to test the clarity of the questions (whether any question was unclear or ambiguous). Minor modifications were done for some mysterious statements, otherwise, almost all items were clearly understood and the responses were found appropriate. Modifications were done on the final form of the tools. The result of the pilot study confirmed that the study is feasible.

2.7. Procedure of the Study

Once official permission was taken, the researchers started to collect data from those patients who met the inclusion criteria. Food frequency sheet was applied for those patients first, the patient will be considered non-compliant to diet regimen if the patient takes in any of the 4 food categories (protein, potassium, sodium, and phosphorus) more than three times per week or drink > 250 ml more than allowed amount for > 3 days per week, included in the study. The purpose of the study was explained to the patients and those who agreed to participate were recruited. Sixty patients were equally assigned into two groups, the control group, who received the routine hospital care, and the study group who received the nursing guideline. Patients were interviewed individually, and were followed up for two consecutive months. Six tools were utilized to collect data, all tools were filled in in the first week. The study group received teaching sessions during the hemodialysis session two times per week in the 1st, 2nd and 3rd weeks, while in the 4th week all tools except socio-demographic data sheet were collected from both the study and control groups. In the 4th and 5th weeks, the study group received again the teaching sessions, while there was no contact between the researchers and the patients in the 6th and 7th weeks, in the 8th week the five tools were collected from both groups. The nursing guideline covered information regarding definition, signs and symptoms of renal failure, hemodialysis, and the optimum dietary and fluid regimen (the allowed and non-allowed types of food and the amount of allowed fluid and how to calculate the amount). Also information regarding protein and electrolytes (potassium, sodium, and phosphorus) was provided regarding the function, the food rich in these mentioned types and the food that had fewer protein and electrolytes and also the allowed daily amount of these foods, as well as the hazards that the patient may suffer if he did not follow the mentioned regimen. Finally, general advices to overcome the sense of thirst and food problems were included. Photos and illustrated brochures related to the allowed and forbidden foods to facilitate learning were available. Each session took around 15–20 minutes based on patients' understanding. Data collection phase was conducted over a period of six months started from beginning of August 2015 and to the end of January 2016. The time taken by the patients to complete all the tools was approximately from 20 to 30 minutes.

2.8. Statistical Design

Descriptive statistics were used to summarize demographic characteristics of the patients. Data were revised, coded, analyzed and tabulated using number and percentage distribution and carried out using the Statistical Package for Social Sciences (SPSS) version 16. The statistical tests used were Chi square t-test and r-test. A value of $p \leq 0.05$ was considered to be statistically significant.

3. Results

Finding of the current study are presented in two sections: 1) Description of the study subjects' socio-demographic characteristics, and medical related information (dialysis session information, blood pressure measurements, BMI, and biochemical indicators), and 2) Comparison of knowledge, attitude and compliance to diet and fluid regimen, as well as food frequency intake compliance, between study and control groups, in addition to correlation between dietary compliance, dietary knowledge and dietary attitude scores of the study and control groups along the study period.

3.1. Section (1): Description of the subjects' socio-demographic characteristics, and medical related information.

Table (1): Frequency and percentage distribution of the socio-demographic data and hemodialysis session information of the study and control groups (n= 60)

Variables	Study group n=30		Control group n=30		Test	P-value
	No	%	No	%		
Age (in years):						
20-	10	33.3	6	20		
30-	3	10	9	30	t-test=	0.733
40-	4	13.3	5	16.7	0.344	
50-	13	43.3	10	33.3		
Mean $\pm$ SD	45.33±18.66		43.50±15.58			
Gender:						
Male	13	43.3	11	36.7	$X^2 =$	0. 792
female	17	56.7	19	63.3	0.278	
Marital status:						
Married	22	73.3	23	76.7	$X^2 =$	
Not married	8	26.7	7	23.3	0.089	0.766
Number of family member:						
< 5	18	60	19	63.3	$X^2 =$	
$\geq$ 5	12	40	11	36.7	0.071	0.791
Education:						
Illiterate	7	23.3	8	26.7	$X^2 =$	
Read and write	6	20	6	20	0.119	0.989
Secondary	7	23.3	7	23.3		
Higher	10	33.3	9	30		
Work status:						
Work	10	33.3	5	16.7	$X^2 =$	0.233
Don't work	20	66.7	25	83.3	2.22	
Income from patient's view:						
Sufficient	8	26.7	10	33.3	$X^2 =$	0.779
Insufficient	22	73.3	20	66.7	0.317	
Frequency of dialysis:						
3 sessions/week	27	90	28	93.3	$X^2 =$	1.00
4 sessions/week	3	10	2	6.7	0.218	
Duration of dialysis session (in hours):						
3 hours	8	26.7	6	20	$X^2 =$	0.08
4 hours	22	73.3	24	80	0.368	

Table (1) shows that the mean age was 45.33±18.66 and 43.50±15.58 for the study and control groups respectively, while 56.7% and 63.3% of the study and control groups respectively were females, and 73.3% and 76.7% of the study and control groups respectively were married. Moreover, 60% and 63.3% of the study and control groups respectively leaved with less than 5 family members.

In relation to education, 33.3% and 30% of the study and control groups respectively had higher education, while 66.7% of the study group and 83.3% of the control group had no work, and 73.3% and 66.7% of the study and control groups had insufficient income.

Ninety percent of the study group and 93.3% of the control group were scheduled on 3 hemodialysis sessions per week. Moreover, 73.3% of the study group and 80% of the control group had hemodialysis for 4 hours in each session. The table shows that there were no statistically significant differences between the study and control groups either regarding socio-demographic data or hemodialysis session information.
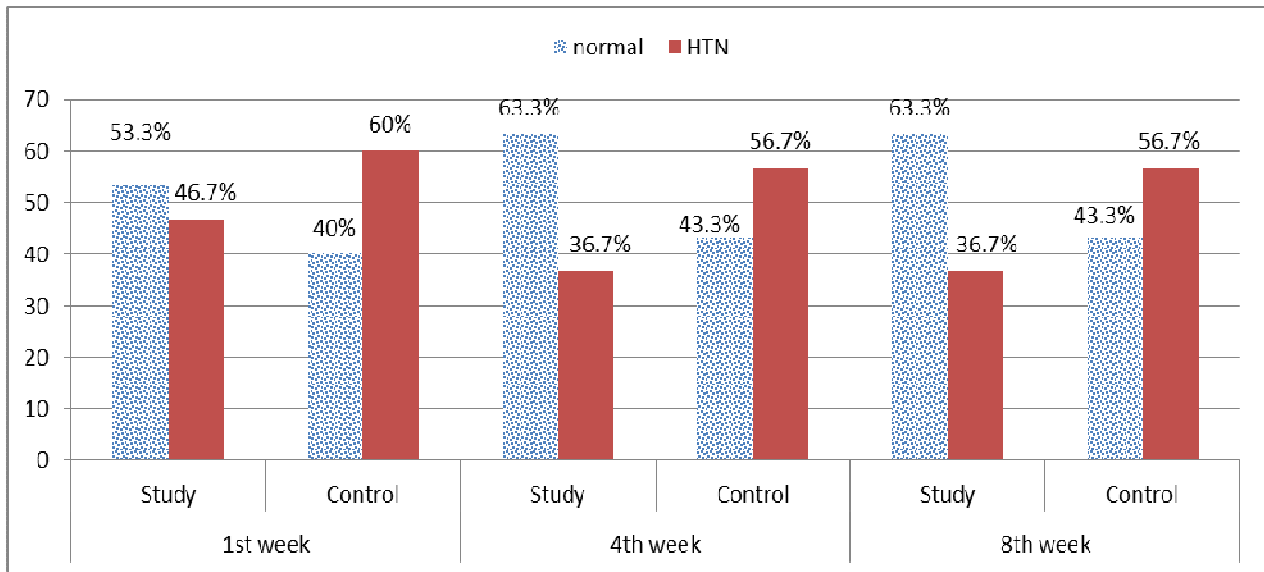
Figure (1): Percentage distribution of blood pressure measurements for the study and control groups along the study period (n= 60)

Figure (1) shows that 53.3% and 40% of the study and control groups respectively had normal blood pressure in the 1st week, while in the 8th week, 63.3% and 43.3% of the study and control groups respectively had normal blood pressure. There were no statistically significant differences between both groups along the study period (X^2= 1.072, p-value= 0.974) in the 1st week, and (X^2= 2.40, p-value= 0.20) in the 4th as well as 8th weeks.
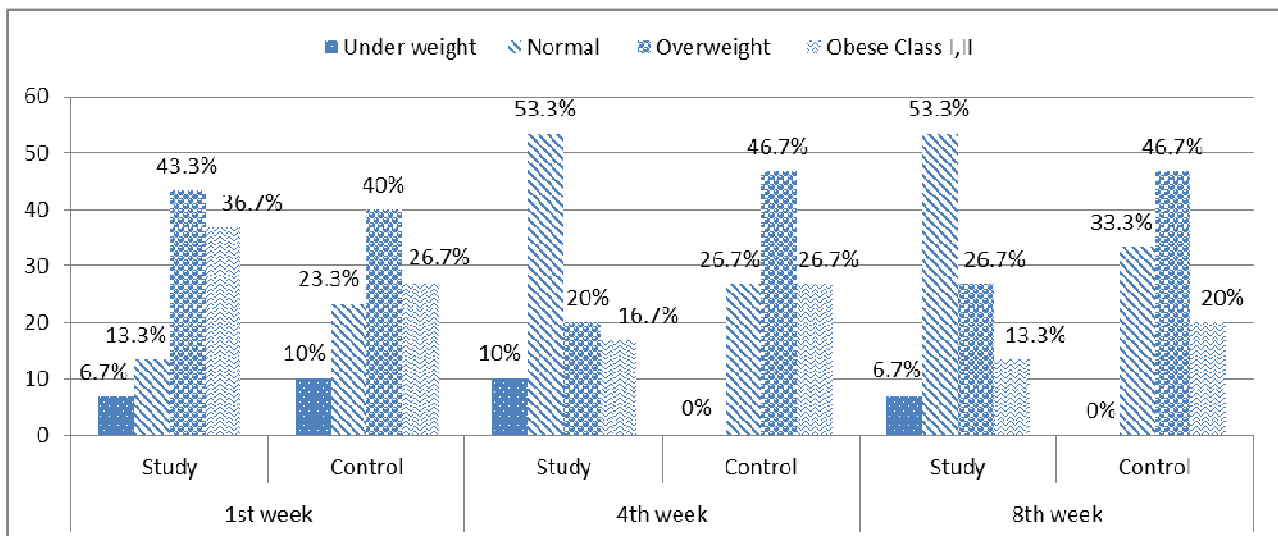

Figure (2): Percentage distribution of the body mass index (BMI) for the study and control groups along the study period (n= 60).

Figure (2) reveals that, 13.3% and 23.3% of the study and control groups respectively had normal BMI in the 1st week, while in the 4th week, 53.3% and 26.7% of the study and control groups respectively had normal BMI, and in the 8th week 53.3% and 33.3% of the study and control groups respectively had normal BMI. There were no statistically significant differences between the study and control groups in the 1st week (X^2= 1.52, p-value= 0.9), and 8th week (X^2= 5.42, p-value= 0.14), while in the 4th week there was a statistically significant difference between the study and control groups (X^2= 9.55, p-value=0.02).

Table 2: Frequency and percentage distribution of the biochemical indicators of the study and control groups along the study period (n= 60).

Variables	1st week				4th week				8th week			
	Study		Control		Study		Control		Study		Control	
	No	%	No	%	No	%	No	%	No	%	No	%
Creatinine:												
- Normal value	2	6.7	3	10	5	16.7	3	10	7	23.3	4	13.3
- Above value	28	93.3	27	90	25	83.3	27	90	23	76.6	26	86.7
X^2	0.218				0.576				0.096			
p-value	0.606				0.5				0.975			
Phosphorus:												
- Normal value	21	70	20	66.7	23	76.7	20	66.7	24	80	18	60
- Above value	9	30	10	33.3	7	23.3	10	33.3	6	20	12	40
X^2	0.077				0.739				2.85			
p-value	0.781				0.567				0.091			
Sodium:												
- Normal value	21	70	19	63.3	23	76.7	22	73.7	24	80	20	66.7
- Above value	9	30	11	36.7	7	23.3	8	26.7	6	20	10	33.3
X^2	0.30				0.089				1.36			
p-value	0.584				1.00				0.243			
Potassium:												
- Normal value	13	43.3	7	23.3	19	63.3	11	36.7	21	70	11	36.7
- Above value	17	56.7	23	76.7	11	36.7	19	63.3	9	30	19	63.3
X^2	2.70				4.26				6.69			
p-value	0.100				*0.039				*0.010			
Hemoglobin:												
- Normal value	0	0	2	6.7	4	13.3	2	6.7	4	13.3	2	6.7
- Below value	30	100	28	93.3	26	86.7	28	93.3	26	86.7	28	93.3
X^2	2.069				0.674				0.674			
p-value	0.492				0.796				0.796			

* Significant ≤ 0.05.

Table (2) shows that there were no statistically significant differences between the study and control groups in relation to creatinine, phosphorus, sodium, and hemoglobin values along the study period. However, there were statistically significant differences in the potassium value between the study and control groups in the 4th week ($X^2 = 4.26$, p-value= 0.039) and 8th week ($X^2 = 6.69$, p-value= 0.010)

3.2. Section (2): Comparison of knowledge, attitude and compliance to diet and fluid regimen, as well as food frequency intake compliance, between study and control groups, in addition to correlation between dietary compliance, dietary knowledge and dietary attitude scores of the study and control groups along the study period.

Table (3): Frequency and percentage distribution of knowledge level and comparison of mean knowledge scores between the study and control groups along the study period (n= 60).

Parameters	1st week				4th week				8th week			
	Study		Control		Study		Control		Study		Control	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Level of satisfaction:												
-Satisfactory level (20-25)	4	13.3	3	10	29	96.7	4	13.3	28	93.3	4	13.3
-Unsatisfactory level (0-19)	26	86.7	27	90	1	3.3	26	86.7	2	6.7	26	86.7
X^2	0.16				42.08				38.5			
p-value	1.00				**0.000				**0.000			
Mean $\pm$ SD	10.2 ± 3.35		10.26 ± 3.4		22.2 ± 2.7		10.73 ± 3.6		20.83 ± 2.7		10.73 ± 3.6	
t-test	0.115				13.97				12.21			
p- value	0.912				**0.000				**0.000			

** Significant = 0.000.

Table (3) shows that 13.3% and 10% of the study and control groups respectively had satisfactory level of knowledge in the 1st week, while in the 8th week, 93.3% and13.3% of the study and control groups respectively had satisfactory level of knowledge. Moreover, there was no statistically significant difference in

mean knowledge scores between the study and control groups in the first week ($X \pm SD = 10.2 \pm 3.35$ & 10.26 ± 3.4 respectively), (t-test= 0.115, p-value= 0.912). however, there were statistically significant differences between the study group and control groups in the 4th and 8th weeks whereas t-test= 13.97, p-value= 0.000 and t-test= 12.21, p-value= 0.000 respectively.

Table (4): Comparison of mean scores of attitude toward diet between the study and control groups along the study period (n= 60).

Parameters	1st week		4th week		8th week	
	Study	Control	Study	Control	Study	Control
Mean $\pm$ SD	46.3 ± 12.1	47.7 ± 11.9	86.5 ± 7.4	47.7 ± 11.9	82.5 ± 11.9	47.8 ± 11.8
t-test	0.452		15.21		11.34	
p- value	0.586		**0.000		**0.000	

** Significant = 0.000.

Table (4) shows that there was no a statistically significant difference between the study and control groups in the 1st week in mean scores of attitude toward diet (t-test= 0.452, p-value= 0.586), while after implementation of the nursing guideline for the study group, the mean attitude scores were significantly higher among the study group than the control group in the 4th and 8th weeks, whereas t-test= 15.21, p-value= 0.000 and t-test= 11.34, p-value= 0.000 respectively.

Table (5): Frequency and percentage distribution of compliance level and comparison of mean scores of compliance to diet regimen between study and control group along the study period (n= 60).

Parameters	1st week				4th week				8th week			
	Study		Control		Study		Control		Study		Control	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Level of compliance: -Compliance (88-125)	9	30	7	23.3	24	80	9	30	20	66.7	7	23.3
-Non-compliance (25-87)	21	70	23	76.7	6	20	21	70	10	33.3	23	76.7
X^2	0.341				15.15				11.41			
p-value	0.559				**0.000				**0.000			
Mean $\pm$ SD	57.9 ± 17.0		57.2 ± 15.6		93.6 ± 18.4		57.8 ± 16		88.3 ± 19.7		57.3 ± 15.5	
t-test	0.166				8.07				6.78			
p- value	0.892				**0.000				**0.000			

** Significant = 0.000.

Table (5) shows that 30% and 23.3% of the study and control groups respectively had compliance to diet and fluid regimen in the 1st week, while in the 8th week 66.7% and 23.3% of the study and control groups respectively had compliance to diet and fluid regimen. Regarding mean scores of compliance to the diet and fluid regimen, the table shows that in the 1st week, no statistically significant difference was detected between both groups (t-test: 0.166, p-value: 0.892), while in the 4th and 8th weeks, the mean scores of the study group significantly increased than the control group (t-test: 8.07, p-value: 0.000) , (t-test =6.78, p-value =0.000 respectively).

Table (6): Frequency and percentage distribution of food frequency compliance and fluid regimen among the study and control groups along the study period (n =60).

Variables	1st week				4th week				8th week			
	Study		Control		Study		Control		Study		Control	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Food rich in protein:												
-Compliance ($\leq$ 3 times/week)	11	36.7	12	40	22	73.3	11	36.7	19	63.3	10	33.3
-Non-compliance (>3 times/week)	19	63.3	18	60	8	26.7	19	63.3	11	36.7	20	66.7
X^2	0.269				8.14				5.408			
P-value	0.604				*0.005				*0.025			
Food rich in sodium:												
-Compliance ($\leq$ 3 times/week)	10	33.3	12	40	19	63.3	11	36.7	16	53.3	12	40
-Non-compliance (>3 times/week)	20	66.7	18	60	11	36.7	19	63.3	14	46.7	18	60
X^2	0.284				4.28				1.072			
P-value	0.605				*0.05				0.975			
Food rich in potassium:												
--Compliance ($\leq$ 3 times/week)	11	36.7	11	36.7	21	70	11	36.7	22	73.3	12	40
-Non-compliance (>3 times/week)	19	63.3	19	63.3	13	30	19	63.3	8	26.7	18	60
X^2	0				6.695				6.763			
P-value	0				*0.01				*0.01			
Food rich in phosphorus:												
-Compliance ($\leq$ 3 times/week)	13	43.3	14	46.7	20	66.7	12	40	18	60	13	43.3
-Non-compliance (>3 times/week)	17	56.7	16	53.3	10	33.3	18	60	12	40	17	56.7
X^2	0.075				4.542				2.461			
P-value	0.696				*0.05				0.144			
Fluid intake:												
-Compliance (allowed amount or more till 250 ml > 3 times/week)	15	50	13	43.3	22	73.3	12	40	23	76.7	13	43.3
-Non-compliance (more than 250 ml above the allowed amount)	15	50	17	56.7	8	26.7	18	60	7	23.3	17	56.7
X^2	0.26				6.76				6.943			
P-value	0.604				*0.01				*0.01			

* Significant $\leq$ 0.05.

Table (6) revealed that there were no statistically significant differences in compliance of food rich in protein, sodium, potassium, phosphorus and compliance to fluid regimen between the study and control groups during the 1st week. However, there were statistically significant differences in compliance to all food variables and fluid intake between the study and control groups during the 4th week. Moreover, in the 8th week, there were statically significant differences between the study and control groups only in the compliance to food rich protein, potassium and fluid intake.

Table 7: Correlation between dietary and fluid knowledge, attitude and compliance of the study and control groups (n= 60).

Variables	Study Group		Control Group	
	Dietary & Fluid Compliance		Dietary & Fluid Compliance	
	r-test	p- value	r-test	p- value
Dietary and fluid knowledge	0.423	*0.020	.600	**0.000
Dietary and fluid attitude	0.628	**0.000	0.914	**0.000

* Significant $\leq$ 0.05.
** Significant = 0.000.

Table (7) shows that there were positive correlations between knowledge, attitude and compliance regarding dietary and fluid regimen among the study and control groups after implementation of the nursing guideline.

4. Discussion

Chronic kidney disease is a common disorder affecting more than 50 million people worldwide. Dietary compliance is critical in the treatment of hemodialysis patients, consequently, educating patients must be one of the major concerns of health professionals. Therefore, the aim of this study was to evaluate the effect of nursing guideline on dietary and fluid compliance among patients undergoing hemodialysis**.**

Regarding demographic characteristics, the present study results show that the mean age of all studied sample (study & control groups) was 44.47 ± 17.03, the dominant gender was female, about three quarters of both the study and control groups were married, with around three fifths of the studied sample have family members less than five. In addition, nearly one third of both the study and control groups had higher education, with two thirds of the study group and majority of the control group did not have work, moreover, more than three fifths of the studied sample had insufficient income. These study results agreed with those of a study done by Mansour et al. (2014), who studied the impact of education program on protein balance among hemodialysis patients, they found that the mean age of the study sample was 46.95 ± 15.7, of these 62.5 % were married, over half of the sample had family number of 4 to 6, as well as half of the studied sample had university education, however, the dominant gender in their study was male.

In relation to hemodialysis session information, in this study, most of both the study and control groups were on 3 hemodialysis sessions per week. Moreover, nearly three quarters of both groups were scheduled on 4 hours hemodialysis per session. This finding also in the same line with Ibrahim et al. (2009), who found that the patients received 2-3 weekly hemodialysis sessions.

Regarding blood pressure measurements, the current study results showed that there was no statistically significant difference between the study and control groups regarding blood pressure measurements along the study period despite of increasing number of patients who had normal blood pressure among the study group when compared to the control group after implementation of the nursing guideline. BMI shows a statistically significant improvement in the study group when compared to control group in the 4th week. These results may reflect the salts and fluid restriction of the study group after implementation of the nursing guideline. In the same line, Davison, Negrato, Cobas, and Matheus (2014), found that patients who reported compliance to the diet had lower BMI and diastolic blood pressure than the other group, while Mohsen et al. (2013) found that there was some stability of BMI in both groups. Similarly, Baraz, Mohammadi and Borumand (2006) evaluated the nursing effect of video movies on the quality of life and the reduction of physical problems among hemodialysis patients in Tehran. Findings pointed out the significant decline of urea, uric acid, phosphor, blood pressure, overweight during sessions, elevated calcium and improved life style.

Regarding biochemical indicators, the present study results revealed that there were no statistically significant differences between the study and control groups in relation to creatinine, phosphorus, sodium, and hemoglobin values along the study period. This result can be interpreted since these indicators are dependent on medications rather than diet only, therefore, most of the hemodialysis patients are taking medications for phosphorus, and hemoglobin. In the same context, Schmid, Schiffl, and Lederer (2010) revealed that anemia among hemodialysis patients is common and they often have severe complications that can be managed successfully by erythropoiesis- stimulating agents' administration and iron supplementation. Meanwhile, the study findings are contradicting with those of a study done by Mohsen et al. (2013), who found that there is an increasing hemoglobin level among patients in the study group, meanwhile the means were stable among patients in the control group throughout the study phases. As well, Karavetian, De Vries, Rizk, and Elzein (2014) found that there was positive relationship between nutrition education and improvement of serum phosphorus.

In this study, potassium is the only biochemical indicator that shows statistically significant increase in the number of patients who had normal potassium value in the study group when compared to the control group after implementation of the nursing guideline during the 4th & 8th weeks. A high potassium intake is related with an increased death risk in these patients because it can lead to cardiac arrest. This results may reflect the compliance of the study group to decrease food rich in potassium after implementation of nursing guideline. In a similar study, Garagarza, Valente, Oliveira, and Caetano (2015) found that the nutritional intervention demonstrated a significant and continuous decrease in the number of patients with hyperkalemia from 52.0% to 35.8%.

This study results revealed that both groups had mean knowledge scores representing less than half of the total knowledge scores, which may indicate that all patients in the studied sample had unsatisfactory level of knowledge regarding diet and fluid regimen in the 1st week. While after implementation of the nursing guideline, the study group had statistically significant higher mean knowledge scores when compared to control group in the 4th and 8th weeks. The enhancement of participants' knowledge might be attributed to their willingness to acquire knowledge because most of them started dialysis less than one year ago and nearly half of them were educated.

The current study finding was in agreement with Abo Deif, Elsawi, Selim, and NasrAllah (2015), who declared that nursing training program on hemodialysis patients had improved the knowledge about their dietary management. Additionally Desroches et al. (2011) stated that the education intervention contributed to improving the knowledge base on compliance to dietary advice. As well, Mohsen et al. (2013), who studied the effect of nursing education on patient's outcomes, found that none of the patients in the study and control groups had satisfactory knowledge at the pre-program phase and mean knowledge score among patients in the study group, the level increased immediately after the program, and continued to be high along the four months of the

study period. Meanwhile, the means were stable among patients in the control group.

Concerning attitude toward diet and fluid regimen, the present study findings revealed that patients in the study group acquired statistically significant higher mean attitude scores when compared to the control group after implementation of the nursing guideline, which may indicate that the study group had positive attitude toward diet and fluid regimen. In a study conducted by Jafari et al. (2014), to measure effect of diet education on blood pressure changes and interdialytic weight in hemodialysis patients, they reported that educating patients with a special emphasis on diet can have a positive effect on their attitude.

In relation to diet and fluid compliance, the current study results showed that both groups had mean compliance scores less than half of total compliance scores in the 1st week. Meanwhile, the study group had statistically significant increase in the mean compliance scores when compared to the control group after implementation of the nursing guideline, which might indicate that the study group is more compliant to diet and fluid regimen than the control group. This might be due to improvement of participants' knowledge and attitude whereas patients' knowledge and attitude significantly contribute to their perceptions of the benefits of dietary compliance as well as the negative consequences of non-compliance, specially that the current study results showed positive correlation between dietary knowledge and dietary compliance among the study and the control groups and highly positive correlation between dietary attitude and dietary compliance among the two groups.

These findings were in agreement with Hashemi, Tayebi, Rahimi, and Einollahi (2015), who found recently that most hemodialysis patients did not strictly adhere to their dietary regimens, they also concluded that education and counseling services that are provided through the continuous care model can improve hemodialysis patients' dietary compliance. However, these results differ from Sayed, et al. (2014), who found that although patients know that it is important to decrease the amount of fluids and water, they find difficulties to decrease the amount they drink every day. Furthermore, results contrasted with Shailendranath, Ushadevi, and Kedlaya (2014), who stated that there is no correlation between knowledge, attitude and practice of renal dietary recommendations among maintenance hemodialysis population.

Regarding food frequency compliance, the present study results concluded that there was statistically significant increase in the number of patients compliant to diet regimen regarding protein, sodium, potassium and phosphorus and fluid intake after implementation of the nursing guideline when compared to the control group in the 4th week. The study results come into the same line with a study done by Baraz, Parvardeh, Mohammadi & Broumand (2010) who concluded that nursing intervention contributes to compliance to the restricted food (food rich in sodium, phosphorus and potassium), and fluid restriction. Moreover, Montazeri and Sharifi (2014), who evaluate the nutritional knowledge in terms of dietary sources of protein, phosphorous, potassium and fluids restriction in Hemodialysis Patients found that nutritional knowledge contribute to fluid adherence. While Chan, Zalilah, and Hii (2012) found that approximately one-quarter of the subjects were actually compliant to dietary (27.7%) and fluid (24.5%) restrictions. The change in food frequency of the study group after guideline implementation highlights the importance of a nursing intervention, which may improve the ability to measure the prescribed quantity of fluid and evaluate the nutrients in chosen foods and match them with the prescribed amounts.

6. Conclusion

The study findings supported the three research hypotheses as, they concluded that nursing guideline statistically improved knowledge, compliance and attitude regarding diet and fluid regimen of the study group, who received the nursing guideline when compared to the control group, who received the routine care. A highly positive correlation between nursing level and dietary compliance was found. As well, a positive correlation between dietary knowledge and dietary compliance and a highly positive correlation was found between dietary attitude and dietary compliance.

7. Recommendations

As the nursing guideline had a significant improvement on patient's knowledge, compliance and attitude; so the following recommendations were concluded:
1. It is suggested to apply the nursing guideline for the hemodialysis patients in the early course of the hemodialysis, so that the patients have a maximum benefit.
2. Nursing guideline could be printed and used in the hemodialysis units as reference guide for nurses.
3. Replicate the study on a larger study sample in different settings to generalize the results.
4. Further studies may be needed to determine the stability of the effect of the nursing guideline on the compliance on diet and fluid regimen.

8. Nursing Implications

Considering nursing implications for practice, the nurse would have a pivotal role in implementation of the nursing guideline regarding diet and fluid regimen in order to reduce the risk of complications. As for

implications for nursing education, the nursing guideline would provide a reference framework to be taught in basic and continuing education programs as a practice for the health professionals. This study may provide a practice framework for the future development of other nursing evidence based practice.

References

Abo Deif, H., Elsawi, K., Selim, M., & NasrAllah, M. (2015): Effect of an educational program on adherence to therapeutic regimen among chronic kidney disease stage5 (CKD5): Patients under maintenance hemodialysis. Journal of Education and Practice; 6 (5): 21- 33.

Baraz, SH., Mohammadi, E., & Borumand, B. (2006): The effect of self-care educational program on decreasing the problems and improving the quality of life of dialysis patients. Scientific Journal of Kurdistan University of Medical Sciences; 10 (4): 69-79.

Baraz, H., Parvardeh, S., Mohammadi, E., & Broumand B. (2010): Dietary and fluid compliance: An educational intervention for patients having hemodialysis. Journal of Advanced Nursing; 66 (1): 60–68

Chan, YM., Zalilah, MS., Hii, SZ. (2012): Determinants of compliance behaviors among patients undergoing hemodialysis in Malaysia. PLoS ONE; 7(8):e41362.

Davison, K A., Negrato, CA., Cobas, R., Matheus, A. (2014): Relationship between adherence to diet, glycemic control and cardiovascular risk factors in patients with type 1 diabetes: A nationwide survey in Brazil. Nutrition Journal; 13:19. doi:10.1186/1475-2891-13-19

Desroches, S., Lapointe, A., Ratté, S., Gravel, K., Légaré, F., and Thirsk, J. (2011): Interventions to enhance adherence to dietary advice for preventing and managing chronic diseases in adults: A study protocol, BMC Public Health; 11(111). 1-4.

Ganiyu, A.B., Mabuza, L.H., Malete, N.H., Govender, I., & Ogunbanjo, G.A. (2013): Non-adherence to diet and exercise recommendations amongst patients with type 2 diabetes mellitus attending Extension II Clinic in Botswana. Afr J Prm Health Care Fam Med.;5(1) 457-66.

Garagarza, C.A., Valente, A.T., Oliveira, T.S., Caetano, C.G. (2015): Effect of personalized nutritional counseling in maintenance hemodialysis patients. Hemodialysis International; 19(3):412-18.

Hashemi, S., Tayebi, A., Rahimi, A., & Einollahi, B. (2015): Examining the effect of continuous care model on adherence to dietary regimen among patients receiving hemodialysis. Iran J Crit Care Nurs.;7(4): 215-220.

Ibrahim, S., Darwish, H., Abed El-Rahaman, M., and Belal, D. (2009): Quality of care assessment and adherence to the international guidelines considering dialysis, water treatment and protection against transmission of infections in University Hospital Based Dialysis Unit in Cairo, Egypt, Med. J. Cairo Univ.; 77 (1): 155-160.

Jafari, F., Mobasheri, M., & Mirzaeian, R. (2014): Effect of diet education on blood pressure changes and interdialytic weight in hemodialysis patients admitted in Hajar Hospital in Shahrekord, Mater Sociomed; 26(5): 318-320.

Jawadagi, S. (2014). A descriptive study was designed "A study to assess the knowledge and practices of dietary regulations in chronic renal failure patients undergoing hemodialysis at K.L.E'S Hospital and MRC Belgaum. IOSR Journal of Nursing and Health Science; 3 (1 Ver. II): 36-45.

Karavetian, M., De Vries, N., Rizk, R., & Elzein, H. (2014): Dietary educational interventions for management of hyperphosphatemia in hemodialysis patients: A systematic review and meta-analysis. Nutrition Reviews; 72(7): 471–482.

Khalil, A.A, Frazier, S.K. (2010): Depressive symptoms & dietary non adherence in patients with end stage renal disease receiving hemodialysis: A review of quantitative evidence. J. of Mental Health Nurs.; 31(5): 324-30.

Kugler, C., Maeding, I., & Russell, C. (2011): Non-adherence in patients on chronic hemodialysis: An international comparison study, J Nephrol., 24(3): 366-75.

Mahmoud, S.A. A., Selim, M., Abdel Raouf, H. (2014): Assessment of Self-Care Practice of Patients on Maintenance Hemodialysis at Cairo University Hospitals, Journal of Education and Practice; 5(39): 161-174.

Mahmoud, S., & Abd-Elaziz, N. (2015): Association between health locus of control, self-care and self-efficacy in patients with end stage renal disease undergoing hemodialysis. Life Sci. J.;12 (11): 58-72.

Mansour, M.A., Youssef, HM., Salameh, T.N., & Yaseen, R.W. (2014): Impact of education program on protein balance among hemodialysis patient. World Journal of Medical Sciences; 11 (1): 69-77.

Mohsen, M.M., Mohammed, W.Y., Riad, N.A., & Atia, G.A. (2013): Impact of designed nursing intervention protocol for hemodialysis patients on patient's outcomes. Journal of Biology, Agriculture and Healthcare; 3 (16): 53-66.

Montazeri, R.S., & Sharifi, N. (2014): Evaluation of nutritional knowledge in terms of dietary sources of protein, phosphorous, potassium and fluids restriction in hemodialysis patients. Jentashapir J. Health Res.; 5(4):

e21878. DOI: 10.5812/jjhr.21878

Port, F. (2014): Practice-based versus patient-level outcomes research in hemodialysis: The DOPPS (Dialysis Outcomes and Practice Patterns Study) Experience. American Journal of Kidney Diseases; 64(6): 969–977.

Rushe, H., & McGee, H.M. (1998): Assessing adherence to dietary recommendations for hemodialysis patients: The Renal Adherence Attitudes Questionnaire (RAAQ) and the Renal Adherence Behaviour Questionnaire (RABQ). Journal of Psychosomatic Research; 45(2): 149-157.

Sayed, M., Abdelatty, M., ELRawy, B., Yasser, M., Salman, H., Husein, R., Mostafa, M., Hasan, F., & Ahmed, Z. (2014): Assessment of socio-economic burden of hemodialysis on ESRD patients in Suez Canal Cities and ELArish. American Journal of Research Communication; 2(7): 125-134.

Schmid, H., Schiffl, H., Lederer, S.R. (2010): Pharmacotherapy of end stage renal disease. Expert Opin Pharmaco Ther;11(4): 597-613.

Shailendranath, B., Ushadevi, C., & Kedlaya, P.G. (2014): Impact of knowledge, attitude and behavior among maintenance hemodialysis patients for adherence to dietary regimen – A single center experience. International Journal of Humanities and Social Science; 4 (12): 257- 262.