Effect of an Educational Program on Adherence to Therapeutic Regimen among Chronic Kidney Disease Stage5 (CKD5) Patients under Maintenance Hemodialysis

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Abstract

The burden of chronic disease on health care services worldwide is growing and the increased development of educational interventions which help patients to better manage their conditions is evident internationally. It has been recognized that poor adherence can be a serious risk to the health and wellbeing of patients. Adherence to fluid restrictions, dietary and medication guidelines as well as attendance at prescribed hemodialysis sessions of a hemodialysis regimen are essential for adequate management of chronic kidney disease. The objective of the present study is to investigate the effect of an educational program on adherence to therapeutic regimen among chronic kidney disease stage 5 (CKD5) patients under maintenance hemodialysis at Kasr AlAiny center for Nephrology, Dialysis and transplantation (KAC-NDT), Cairo University. To fulfill the aim of this study a purposive sample of sixty adult male and female patients on maintenance hemodialysis for at least 6 months and not more than one year were assigned. Socio-demographic and medical data sheet, laboratory investigation assessment data sheet, pre/post knowledge assessment data sheet and adherence assessment data sheet were utilized for data collection. The study results revealed, the post total mean knowledge scores of the study subjects increased significantly in follow up assessment times as compared to the pre-program assessment (X^2= 186.332, P= 0.001). The post total mean adherence scores of the study subjects is increased significantly in follow up assessment times as compared to the pre-program assessment (X^2= 34.587 , P= 0.001). Frequent and repeated contacts with renal nurses can help these patients develop problem-solving skills, set goals, and understand their progress in managing multiple aspects of their disease. Individualization of the common educational approach by incorporating the patient's beliefs, behaviors, and emotional and physical feelings as well as culture, economic situation, ability and knowledge of the disease and its treatment supports self-management.

Key wards: chronic kidney disease, hemodialysis, knowledge, adherence, diet and fluid restrictions.

1.   Introduction

Chronic kidney disease stage 5 (CKD5) is a devastating problem both at the personal and national level. It is debilitating, progressive chronic disease and occurs when the kidneys are unable to remove metabolic waste products from the body, although there is no cure, life can be prolonged by following any of these line of treatment, hemodialysis (HD), peritoneal dialysis, or kidney transplantation, (Tanyi & Werner, 2008).

Dialysis is the process used to remove fluid and waste products from the body when the kidneys are unable to do so. The purpose is to maintain the life and well being of the patient until kidney function is restored. Dialysis works on the principles of the diffusion of solutes and ultrafiltration of fluid across a semi-permeable membrane. There are three primary types of dialysis i.e. hemodialysis (primary), peritoneal dialysis, hemofiltration, as well as there are two secondary types of dialysis which are hemodiafiltration, and the intestinal dialysis (National Kidney Foundation, 2010).

Adherence by patients to prescribed treatment regimens can be considered as the interface between effective therapy and effective disease management, as well adherence can be affected by the nature of the relationship between the practitioner and the patient, and their attitudes towards each other, also it has been suggested that practitioner behavior can influence patient behavior and health status. Clark & Jones, (1999). In addition, social factors may also play a role: these include age, marital and socioeconomic status and level of education.

Hemodialysis (HD) patients are asked to adhere to a very difficult treatment regimen consisting of fluid and diet restrictions, medications, and, usually, 3- or 4-hour hemodialysis (HD) sessions three times each week. Thus, patients should follow and adhere to the prescribed regimen for maintaining an optimal health and well-being. It is important for nephrology nurses to spend time with the patient on a regular basis in order to understand the factors that hinder the individual patient from adhering to the treatment regimen. The nurse who knows the patient well is empowered to develop individualized interventions aimed at reducing barriers that

interfere with the patient's ability to adhere the prescribed treatment regimen. Know what interventions help patients overcome the barriers that keep them from adhering to the prescribed treatment.

Patient education is an essential part of all patient care. Knowledge is important for the dialysis patient to be able to deal with the complexities of renal disease and treatment, therefore to be able to adhere to the prescribed treatment regimen so based on that the researcher decided to manage this problem through a designed program to increase their awareness for better adherence.

2. Significance of the study

Chronic kidney disease stage 5 is the most common cause of morbidity and mortality worldwide. In Egypt the estimated annual incidence of (CKD5) is around 74 per million per year and the total prevalence of patients on dialysis is 264 per million (Ahmed et al., 2010). The estimated prevalence of patient on dialysis in Egypt is 80,4532 of 76, 117, 42122 and in USA is 310,3822 of 293, 655,4052 (Right Diagnosis Statistics ,2011). The estimated prevalence of renal failure in Egypt is 109,7052 of 76, 117, 42122 according to (Right Diagnosis Statistics, 2011) .

According to statistics and tendencies of increasing prevalence rates of CKD5 all over the world especially in developing countries and in Egypt in particular, there is a need for sustained active patient education, support and evaluation in order to increase patients' involvement and self-reliance in management of their renal health problems and prevent its complications. Therefore, the current study will be carried out to investigate the effect of an educational program on adherence to therapeutic regimen among chronic kidney disease stage 5 (CKD5) patients under maintenance hemodialysis.

In addition, Salini and   Sajeeth (2013) commented that, most studies on adherence in renal diseases are conducted on post-transplant patients and evaluate the percentage of non adherence to immunosuppressant and outcomes such as death and graft loss. So far, only few studies have been published on the evaluation of adherence by patients with kidney disease not yet on dialysis, a fact that justifies the relevance of the present study.

3. Aim of the study

The current study was carried out to investigate the effect of an educational program on adherence to therapeutic regimen among chronic kidney disease stage 5 (CKD5) patients under maintenance hemodialysis over a period of six month.

4. Materials and Methods:

4.1 Hypotheses:-

There would be no significant difference of patient's adherence scores before and after implementation of the program.

4.2 Research Design

Pre / post test quasi-experimental research design was utilized.

4.3 Sample:

A purposive sample of sixty adult male and female patients on maintenance hemodialysis for at least 6 months and not more than one year were assigned, the sample was selected from Kasr AlAiny center for Nephrology, Dialysis and transplantation (KAC-NDT).

4.3.1. Inclusion criteria

Each patient should be: - (a) Of more than 18 years of age, (b) undergoing hemodialysis for at least 6 months, to one year (c) undergoing hemodialysis for 3 sessions per week. (d) Have not received any educational intervention regarding his/ her illness and its care.

4.4 Setting:

The study was conducted at Kasr AlAiny center for Nephrology, Dialysis and Transplantation (KAC-NDT), Cairo University Hospitals Arab Republic of Egypt.

4.5 Tools:

In order to achieve the purpose of the study the following tools were developed:

4.5.1 Sociodemographic data sheet

It was designed by the researcher to assess relevant socio-demographic   variables such as age, gender, level of education, marital status, employment status, duration of hemodialysis (HD) treatment, and co-morbidity.

4.5.2 Laboratory investigation assessment data sheet

It aimed to assess patients' pre-dialysis monthly serum potassium, calcium and   phosphorus, hemoglobin and urea levels as well as patient's weight, and pre- post dialysis weight. The laboratory values were retrieved from patient's medical records. The interdialytic weight gain (IWG), which defined as the amount of weight gained between two consecutive hemodialysis sessions was calculated.

4.5.3 Pre/post knowledge assessment data sheet

This was constructed by the researchers after reviewing the related literature, to assess patient's knowledge regarding normal function of the kidney, normal value of renal functions tests and serum electrolytes, sign and symptoms of CKD5, prescribed medication, in addition to knowledge related to care of blood access site, and following prescribed dietary regimen and fluid, and the importance of adhering to hemodialysis (HD) sessions etc.

4.5.4 Adherence assessment data sheet

It was designed by the researcher after   review of related literature, to measure adherence of hemodialysis patient related to hemodialysis treatment, medication fluid and dietary restrictions it was divided into 4 main sections, including; (a) questions (1-18) that directly measure adherence to therapeutic regimen (b) question (19-26) to assess counseling related to adherence to therapeutic regimen. (c) Questions (27-33) to assess reasons related to adherence to therapeutic regimen, (d) questions (34- 40) to assess constraints related to adherence to therapeutic regimen.

4.6 Content Validity

Tools were checked and revised by a panel of three nephrologists and three experts of medical surgical nursing to test content validity. Modifications were carried out according to panel judgment on clarity of questions and appropriateness of content.

4.7 Pilot study

Pilot study conducted on 10% of the total sample who were diagnosed with chronic renal failure and fulfilled the inclusion criteria to evaluate the content and test the feasibility, objectivity, clarity, relevancy and applicability of the study tools. Also test retest reliability was calculated to check reliability of the study tools. Consequently the estimation of time needed for data collection was estimated.

5. Ethical consideration:

Information and explanation of the ethical observations of the study were provided to the subjects and they were asked to sign a consent form. After explaining the nature and the benefits of this research. The patients were free to withdraw from the study at anytime, and they were reassured that the decision whether or not to participate in the study would not prevent them from receiving the care that they would normally receive. The subjects were coded to guarantee anonymity**.**

6. Techniques for data collections

Structured interview was utilized to fill out the study tools.

6.1. Procedure

Subjects were approached during their dialysis sessions, the total number of patients at base line assessment dropped to 55 as 5 patients died in the two follow up assessment time. The purpose of the study was explained to the subjects. Those who agreed to participate were given a consent form to sign. The researcher collected the data by reading the questions of the tools to the subjects and filling-in the answers for them. This method was chosen after consideration that some patients were old, unable to use their dominant hand for writing due to the presence of arteriovenous fistula and its immobilization effect during hemodialysis.

The data was collected within the first 2 hours after the initiation of hemodialysis in order to ensure that subjects were not suffering from any dialysis-related discomfort. The sociodemographic and laboratory investigation assessment sheet were obtained from a structured questionnaire and from the clinical records of the patient.

The study was conducted through   the following phases:-

6.1.1. Assessment phase

During the assessment phase the patient's specific needs and problems such as how to care for fistula or graft, how to adhere to prescribed diet, fluid and medications, how to limit complications etc   to develop an educational program   based on assessment needs. The researcher filled socio-demographic data sheet, then laboratory investigation assessment sheet, followed by knowledge   assessment sheet (pre- test) and adherence assessment sheet pre program.

6.1.2. The intervention phase
Through which the designed educational program was delivered to the studied patients over six months.
6.1.3. Evaluation phase:
It was done for each patient to evaluate the effectiveness of educational program after one month and six months post program implementation, and based on finding difference or no difference before and after administration of educational program through refilling knowledge assessment data sheet (post test) and checking changes in laboratory investigation assessment sheet as well as reassessment of adherence sheet.

6.2 Teaching program
The program was designed in the form of knowledge. It was constructed by the researcher after conducting and reviewing related literature. It aimed at helping (CKD5) patient gaining knowledge about their therapeutic regimen which should be reflected on their adherence to treatment, and laboratory investigation results. The program covered the issues related to types of kidney function, renal failure types, causes, manifestation, treatment regimen including diet and fluid restrictions, medication adherence, hemodialysis treatment; importance of adhering to hemodialysis sessions, care of blood access site as well as brief knowledge covered in the program about kidney transplantation. The instructional booklet was presented in Arabic version.

7. Statistical   analysis
Demographic and questionnaire data were coded and entered into Statistical Package for the Social Sciences version 18.5 for windows. Descriptive statistics were generated for all variables**.**

7 .1 Scoring systems
7.1.1 Knowledge scale
The scale assessed 5 areas of adherence with 30 items, including general knowledge about the kidney (8 items), knowledge about medications (4 items), knowledge related to treatment of renal failure (7 items), information related to diet and fluid restrictions (8 items) and finally knowledge related to lab investigations (3 items). The answers were in yes/no format, and multiple response answers each correct answer take one score and the number of correct answers were summed up to provide a knowledge score. The scores were weighted and converted to standardized normal distribution with the maximum score being 55 grades
Scores less than 28 (< 50%) are considered unsatisfactory level of knowledge.
Scores from 28-41(50-74%) are considered satisfactory level of knowledge.
Scores from 42- 55 (>75%) are considered good level of knowledge.
7.1.2 Adherence assessment sheet scores:
It consisted of 40 items assessing adherence of hemodialysis patient to   therapeutic regimen including hemodialysis treatment, medication, fluid restrictions, and diet recommendations the questions which directly measure adherence from each. No response takes 1 score and yes takes 0, while each multiple response ranges from 1 to 5 with a total grades of (75).
Scores less than 37 (< 50%) are considered unsatisfactory level of adherence.
Scores from 37-56(50-74%) are considered satisfactory level of adherence.
Scores from 57 – 75   (> 75 %) are considered good level of adherence.
7.1.3 Adherence indicators
The cut off point of adherence indicators used in this study were serum potassium concentration of >6.0 mEq/l, phosphate level of >7.5 mg/dl or interdialytic weight gain (IDWG) >2.5 kg and urea level >100mg/dl.

8. Results
8.1 As regarding Socio-demographic status
Table (1) and figure (1) shows the patient's demographic characteristics

Table (1) frequency distribution of the study sample N = (60) as regard Sociodemographic characteristics:

Item	No	%
Sex		
- Male	32	53.33
- Female	28	46.67
Age		
• <20	2	3.33
• 20-30	10	16.67
• 31-40	9	15.00
• 41-50	15	25.00
• 51-60	11	18.33
• >60	13	21.67
marital status		
• Single	16	26.67
• Married	40	66.67
• Widow	4	6.67
Level of education		
• illiterate	9	15.00
• read and write	7	11.67
• primary- preparatory	17	28.33
• secondary	15	25.00
• university	11	18.33
• post graduate	1	1.67
Smoking		
• Yes	15	25.00
• No	45	75.00
No. of cigarette per day		
• No	45	75.00
• more than five	1	1.67
• more than ten	5	8.33
• more than twenty	9	15.00
family history of renal failure:-		
• Yes	8	13.33
• No	52	86.67
degree of family relationship:-		
• no one has the disease	52	86.67
• Father	3	5.00
• Brothers	1	1.67
• Uncle \ aunt	4	6.67
Occupation:-		
Employee	9	15.00
Worker	11	18.33
House wife	23	38.33
Retired	17	28.33
Monthly income:-		
Enough	3	5.00
Not-enough	57	95.00
Residency:-		
Rural	4	6.67
Urban	56	93.33
Co-morbid conditions:-		
• Hypertension	24	40.00
• Diabetes mellitus	1	1.67
• Nephritis	2	3.33
• Hypertension &diabetes mellitus	26	43.33
• Non	7	11.67

Figure (1) co-morbidities associated with kidney disease in the study population:
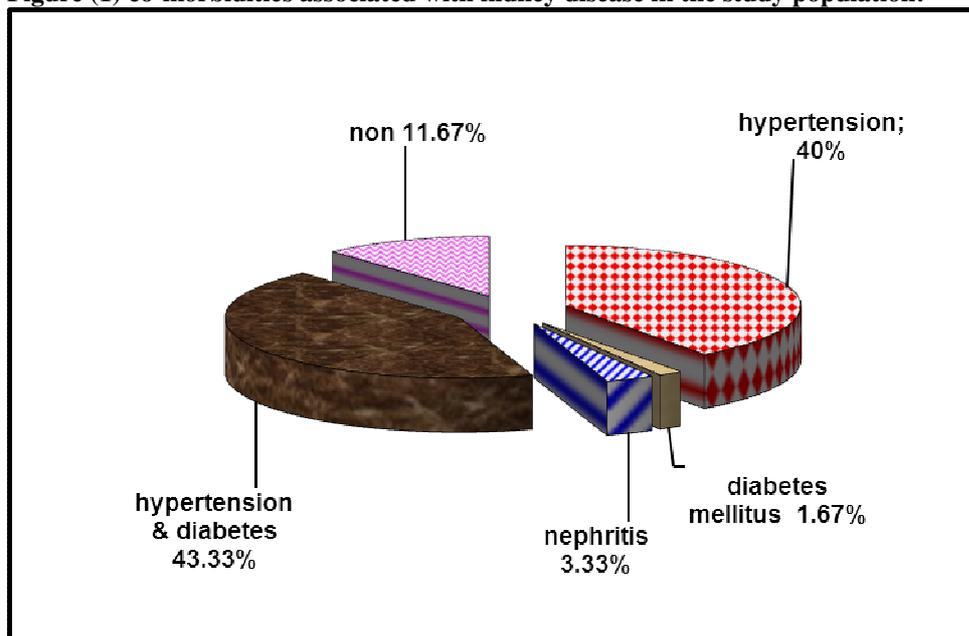

Table (2) & (3) shows the progress of knowledge assessment before and after the study which revealed a significant improvement over the follow up period.

Assessment period / area of knowledge		Preprogram			After one month			After six months.			Chi-Square	
		Unsatisfactory < 28	Satisfactory 28-41	Good >41	Unsatisfactory < 28	Satisfactory 28-41	Good >41	Unsatisfactory < 28	Satisfactory 28-41	Good >41	X²	P-value
Normal kidney & kidney function	N	56	4	0	8	37	10	4	38	13	127.474	<0.001*
	%	93.33	6.67	0.00	14.55	67.27	18.18	7.27	69.09	23.64		
Medication	N	33	18	9	6	22	27	1	7	47	81.697	<0.001*
	%	55.00	30.00	15.00	10.91	40.00	49.09	1.82	12.73	85.45		
Fluid	N	44	13	3	3	35	17	0	32	23	110.860	<0.001*
	%	73.33	21.67	5.00	5.45	63.64	30.91	0.00	58.18	41.82		
Diet	N	55	4	1	13	36	6	6	30	19	107.587	<0.001*
	%	91.67	6.67	1.67	23.64	65.45	10.91	10.91	54.55	34.55		
Lab investigation	N	49	3	8	19	4	32	3	1	51	87.374	<0.001*
	%	81.67	5.00	13.33	34.55	7.27	58.18	5.45	1.82	92.73		
Total knowledge	N	55	4	1	2	44	9	0	23	32	186.332	<0.001*
	%	91.67	6.67	1.67	3.64	80.00	16.36	0.00	41.82	58.18		

Table (3): Paired t- test comparing total knowledge scores pre- program (N= 60), one month and six months   post program (N = 55)

Assessment time	Mean ± SD			Comparison.	Differences		Paired t-test	
	Mean	±	SD		Mean	SD	t	P-value
Pre-program	15.233	±	8.954	Pre-program - After one month	-21.259	7.860	-20.599	<0.001*
After one month.	36.603	±	4.980	Pre-program - After six months	-25.727	8.759	-21.783	<0.001*
After six months.	41.400	±	4.175	After one month - After six months	-4.964	5.018	-7.335	<0.001*

* Significant ≤ 0.05

Table (4): Frequency distribution of the total and subtotal adherence scores pre- program. (N-60) One moth and six months post program (N=55).

* Significant ≤ 0.05

Adherence \ assessment time		Pre-program			After one month.			After six months.			Chi-Square	
		unsatisfactory<37	satisfactory 37-56	Good >56	unsatisfactory <37	satisfactory37-56	Good >56	Unsatisfactory <37	Satisfactory 37-56	Good >56	X²	P-value
Total adherence scores	N	1	57	2	0	50	5	1	31	23	34.587	<0.001*
	%	1.67	95.00	3.33	0.00	90.91	9.09	1.82	56.36	41.82		
Adherence to hemodialysis treatment	N	0	41	19	0	31	24	0	13	42	24.248	<0.001*
	%	0.00	68.33	31.67	0.00	56.36	43.64	0.00	23.64	76.36		
Adherence to medications	N	5	20	35	2	18	35	0	7	48	16.889	0.002*
	%	8.33	33.33	58.33	3.64	32.73	63.64	0.00	12.73	87.27		
Adherence to fluid restrictions	N	21	33	6	17	32	6	17	18	20	17.876	0.001*
	%	35.00	55.00	10.00	30.91	58.18	10.91	30.91	32.73	36.36		
Adherence to diet	N	9	33	18	9	33	13	10	28	17	1.207	0.877
	%	15.00	55.00	30.00	16.36	60.00	23.64	18.18	50.91	30.91		

There was a statistically   significance difference in all adherence dimensions at two times   follow up post program implementation as compared with base line (preprogram assessment) except in adherence to diet restriction , and significant improvement of post program adherence

Table (5): Paired t- test comparing total adherence scores pre program (N= 60), one month and six months   post program (N = 55):

Assessment time	Mean ± SD	Comparison	Differences		Paired t-test	
			Mean	SD	t	P-value
Pre-program	49.483 ± 4.590	pre - After one month	-1.914	5.504	-2.648	<0.001*
After one month.	51.534 ± 4.430	pre - After six months	-6.255	8.280	-5.602	<0.001*
After six months.	56.164 ± 7.544	After one month - After six months	-4.691	9.031	-3.852	<0.001*

* Significant ≤ 0.05

Table (6): Paired t test comparing pre-dialysis weight throughout different assessment times pre-program (N= 60) one month and six months post program (N= 55)

Assessment time	Range			Mean ± SD			comparison	Mean	SD	t	P-value
Weight before hemodialysis per-program	6.000	-	120.000	70.375	±	19.201	Pre- program & one month follow up -	-1.173	7.960	-1.093	0.279
Weight before hemodialysis one month post program	42.000	-	120.000	72.073	±	17.742	Per- program and six months follow up	-1.155	9.110	-0.940	0.351
Weight before hemodialysis six months post program	41.000	-	115.000	72.055	±	17.879	One month & six months follow up	0.018	5.567	0.024	0.981

* Significant ≤ 0.05

As can be seen from the in the table (6) there was   no statistically significance difference observed in pre-dialysis weight in all assessment times throughout the program

Table (7): Paired t- test comparing serum potassium level throughout different assessment times pre-program (N = 60) one month and six months post program (N = 55)

Assessment time	Range			Mean ± SD			comparison	Mean	SD	t	P-value
serum potassium pre program	3.000	-	8.000	4.770	±	1.028	Pre- program & one month follow up -	0.298	1.229	1.799	0.078
serum potassium one month after	3.000	-	6.100	4.533	±	0.749	Per- program and six months follow up	1.120	0.958	8.671	<0.001*
serum potassium six months after	3.000	-	5.000	3.711	±	0.522	One month & six months follow up	0.822	0.887	6.872	<0.001*

* Significant ≤ 0.05

 The levels of serum potassium decreased from a base line of 8 mg/ dl to 5 mg/dl after 6 months post program (p < 0 .001).

Table (8): Correlation between Sociodemographic characteristics and total knowledge scores pre-program (N=60).

Sociodemographic items		Knowledge				Test	
		N	Mean	±	SD	T/F	P-value
Sex	Male	32	14.313	±	8.529	1.434	0.157
	Female	28	11.357	±	7.258		
Age	<20	2	6.500	±	0.707	1.815	0.125
	20-30	10	17.000	±	11.126		
	31-40	9	13.667	±	5.025		
	41-50	15	15.000	±	5.606		
	51-60	11	11.818	±	7.305		
	>60	13	8.846	±	8.989		
marital status	Single	16	12.250	±	9.630	0.158	0.854
	Married	40	13.025	±	6.573		
	Widow	4	14.750	±	15.392		
Is patient is living a lone	Yes	5	9.400	±	5.177	-1.028	0.308
	No	55	13.255	±	8.202		
Monthly income	Enough	3	21.333	±	13.577	1.899	0.063
	not enough	57	12.491	±	7.578		
Residency	Rural	4	10.750	±	4.500	-0.559	0.578
	Urban	56	13.089	±	8.231		
If patients smokes	Yes	15	10.867	±	6.093	-1.154	0.253
	No	45	13.622	±	8.531		
levels of education	not read or write	9	6.778	±	3.492	3.125	0.015*
	read and write	7	11.286	±	6.626		
	primary- preparatory	17	11.882	±	5.656		
	Secondary	15	14.000	±	6.887		
	University	11	19.364	±	11.902		
	post graduate	1	11.000	±	.		
Occupation	Employee	9	14.000	±	10.452	1.199	0.319
	Worker	11	11.727	±	4.982		
	house wife	23	11.087	±	6.324		
	Retired	17	15.647	±	9.924		

* Significant ≤ 0.05

It is apparent from   table (8) that there is no significance difference was evident between most of the demographic characteristics and total knowledge scores.

The table clarifies that statistical significant correlation was found between total knowledge scores and   levels of education, (f = 11.902, p = 0.015).

Table (9): Correlation between Sociodemographic characteristics and total adherence scores pre-program (N = 60).

Sociodemographic items		Adherence				Test	
		N	Mean	±	SD	T/F	P-value
Sex	Male	32	48.688	±	4.314	2.349	0.022*
	Female	28	45.929	±	4.784		
Age	<20	2	50.500	±	0.707	0.499	0.776
	20-30	10	47.400	±	5.232		
	31-40	9	47.889	±	3.689		
	41-50	15	46.000	±	3.117		
	51-60	11	48.182	±	5.437		
	>60	13	47.538	±	6.213		
marital status	Single	16	46.375	±	5.584	1.154	0.323
	Married	40	48.025	±	4.300		
	Widow	4	45.250	±	4.787		
If patient living alone	Yes	5	44.600	±	4.827	-1.400	0.167
	No	55	47.655	±	4.660		
Monthly income	Enough	3	50.333	±	1.528	1.109	0.272
	not enough	57	47.246	±	4.774		
Residency	Rural	4	44.000	±	2.944	-1.511	0.136
	Urban	56	47.643	±	4.735		
If patients smokes	Yes	15	48.600	±	4.672	1.143	0.258
	No	45	47.000	±	4.705		
level of education	not read or write	9	43.000	±	5.050	3.201	0.013*
	read and write	7	46.000	±	4.655		
	primary- preparatory	17	48.588	±	3.203		
	Secondary	15	48.800	±	4.144		
	University	11	47.455	±	5.203		
	post graduate	1	55.000	±	.		
Occupation	Employee	9	47.444	±	4.953	1.732	0.171
	Worker	11	49.091	±	4.323		
	house wife	23	45.783	±	4.805		
	Retired	17	48.471	±	4.375		

* Significant ≤ 0.05

There was a statistically significant relation was found between sex and total adherence scores as female patients had a higher degree of adherence than male patients and a statistically significant relation was also found between   level of education and total adherence scores

Also; it was apparent that in the present study skipping a dialysis treatment and shortening treatment time were often caused by similar types of problems. The physical or other problems lead to the decision to skip a dialysis treatment or shorten treatment time. The physical problems reported included hypotension (50%), cramps (23.08%), fatigue (19.23%), and clots in access site (33.33%). In this regard; Welch, (2004) in studying dialysis attending adherence agreed that nausea, vomiting, diarrhea before or on treatment, high or low blood pressure, itching, hunger, cramping, the need to use the bathroom after the treatment begins, and discomfort during venipuncture were the most contributory factors affecting adherence to hemodialysis sessions or shortening the time of session.

In addition, in the present study nearly half of the study sample (50.91 %) reported that the main cause of not taking medication as prescribed it's side effects also (43.64%) described that it is important to follow dialysis scheduled as this makes them more healthier active and more powerful to meet their life demands. As regard the main cause of limiting fluid intake about (36.36 %) reported that this make their body healthy also (30.91%) had a consensus that the main cause of keeping diet recommendation is that their kidney condition requires that. In the present study more than half of the study sample reported the   main cause of not taking medication was it costs a lot and more than three third (95.00 %) reported that their financial income was not enough.program while (3.64% & 1.85%) shortened dialysis session by 4 to five times in one month and 6 months follow up after program implementation respectively, and about 50 % of the study sample skipped one dialysis session with a month and only five patients in the study sample were died before two follow up times.

In the same line, Hecking et al., (2011) cited that shortening dialysis treatment occurred among (9%) of patients; while skipping dialysis sessions was very rare. Also; Denhaerynck, (2011) agreed that skipping at least one dialysis session per month has been associated with a 25% to 30% higher risk of death. Shortening frequently more than 10 minutes (≥3 times per month) also has been associated with increased mortality.

Moreover, Hecking, et al. (2011) cited that measures of adherence with the dialysis schedule show that shortening dialysis treatment occurred among 9% of patients while skipping dialysis sessions was very rare. In a study of Holley and DeVore (2006) 8.5% of patients skipped one or more hemodialysis sessions within a month and (20.3%) of patients shortened one or more hemodialysis sessions by 10 or more minutes. Overall, shortening one or more dialysis sessions was not associated with higher mortality; however, shortening three or more sessions in one month was associated with 20% higher mortality. Skipping one or more dialysis sessions in a month was associated with a 30% increased mortality risk compared with not skipping, and shortening dialysis time was associated with an 11% higher Relative Risk of mortality.

Discussion:

The current study results delineated a highly statistical significant difference in the study subjects at two times follow up after program implementation, showing improvement of the post program total and subtotal mean knowledge scores among the study subjects, (80.00 %) and (58.18 %) ranked as satisfactory to good levels respectively (p < 0.001 and p <0.001). However, at baseline hemodialysis patients the majority had extremely unsatisfactory knowledge (91.67%) level in the pre- program. In the present study, knowledge scores were not correlated to age among the study sample. These results were in agreement of Abdulmalik, et al., (2014) in which they found that there was no correlation between ages in general and the adherence score.

In consistent with the previous researcher view Oka and Chaboyer, (1999), identified that relatively new hemodialysis subjects had less knowledge about their dietary management than more experienced subjects. For this reason, nurses, physicians, and technicians may take more opportunities to teach and support this group. This additional time spent with this group of subjects may explain why these new hemodialysis subjects perceived they were supported more than experienced subjects.On contrary; the results of Alnaif and Alghanim (2009) in studying knowledge towards health education implications for primary health care services" in Saudi Arabia identified distinct result in which younger respondents (45 years or less) had a significantly higher mean scores of the knowledge of diabetes mellitus than older respondents. Respondents in employment had significantly higher mean scores of knowledge of diabetes than older respondents. As regards the relationship between knowledge and educational level. The findings of the present study revealed a significant statistical correlation between educational level and mean knowledge scores among study subjects throughout the different assessment times (p = 0.015). This is in agreement of Alnaif & Alghanim (2009) as respondents with a higher level of education had a significantly higher mean score of knowledge about diabetes than those with a lower level of education.Abdulmalik et al., (2014) were in agreement of this results in which they commented that there was a significant difference in adherence (P = 0.024) between participants who had no or less than high school education, participants who have high school education and those with a baccalaureate(BSc) degree. On contrary to this result the study conducted by Martin, and Gonzalez (2011) has shown that an increase in knowledge does not necessarily increase a patient's adherence to the prescribed treatment.In addition Sathvik et al., (2007) find a different results in which, there was no significant (P> 0.05) different in the mean medication knowledge scores of patients of different education groups.

In an attempt to explain the rational for increased patient's knowledge in the present study the researcher explained that the study sample identified in this study relatively new in hemodialysis treatment they were below one year and they had less knowledge related to hemodialysis and adherence to treatment regimen so they are eager to acquire more knowledge pertinent to hemodialysis regimen. Statistical findings of the this study concluded that the level of knowledge of the study sample related to dietary regimen (1.67%) were assuming good level of knowledge pre-program and steadily raised to become (10.91% and 34.55%) in two times assessment of follow up but although increased knowledge the study sample had no adherence to dietary regimen (p = .877) In this regard, Llana, Remor, & Selgas, (2014) commented that the relation between information and adherence to treatment in nephrology is still controversial. In this sense, hemodialysis patients reported having more information about diet and this makes sense because any dietary transgression can be a life threatening emergency for a patient on hemodialysis. However, and coinciding with this results, Durose, Holdsworth, Watson, and Przygrodzka (2004), have observed that patients on hemodialysis who had greater dietary knowledge on phosphorus control were also the patients who displayed the least adherence. Thus concluding that although information is necessary it is not enough to change adherence behavior. On contrary the study of Cupisti et al., (2012) suggests that nutritional knowledge of hemodialysis patients, although higher than the general population, is lower for phosphorus with respect to the other nutrients, such as protein, sodium, and potassium. This occurs even in patients with hyperphosphatemia or those taking phosphate binder medications. Contradicting with our result, Lee and Molassiotis, (2002) in their study reported that the lowest mean score of

knowledge was related to the general and basic knowledge about CKD and dietary management, about (20.8%) of subjects had scores (60%) and (76%) of subjects had scores between 60% and 90% and only 2 patients (3.2%) had scores over 90%. Low mean scores were also found in relation to the identification of restricted/non-restricted food, with somewhat higher scores in relation to instructions on fluid restriction, and reasons for compliance and possible consequences of noncompliance.

Contradicting the results of the current study Jeloka,   Toraskar, Sanwaria, and Niture (2014) cited that the   adherence   was looked into at baseline, 26.8% were non-adherent in one or more medicines. After 3 months of detailed prescription and further 3 months of elaborate prescription with a column of "purpose" of medicines, percentage of patients non-adherent for medicines were (21.1% and 14.1%) respectively.

In addition; the present study concluded that there is a statistical significance difference in all adherence dimensions including adherence to fluid restrictions, hemodialysis treatment and medication (p = 0.001, 002 and 0.001) respectively through-out the program,but there is no statistical significant finding present in adherence to diet restriction. This is in agreement of Kugler and Russell, (2011) in which they significantly found a large number of hemodialysis patients in both countries (US and German) have difficulties maintaining their diet (80.4%) and   contrary within our result they had difficulties maintaining fluid (75.3%) restrictions.

Rambod; et al., (2010) cited that chronic haemodialysis setup is ideal for studying the problems of non-adherence and abuse of the medical regimen. The treatment is long-term and contact with the patient is prolonged and intensive. The medical regimen of dialysis is usually very clear cut; therefore, some aspects of adherence can be checked by objective measures. Blood urea nitrogen and potassium have been used as a marker of dietary adherence; interdialytic weight gain is reported as a reliable value to measure fluid non-adherence, phosphate level is affected by the diet and medication adherence.

The present study used the following lab results as indicators for adherence to therapeutic regimen with a cut-off value for each as follows: serum potassium concentration of >6.0 mEq/l, phosphate level of >7.5 mg/dl or interdialytic weight gain (IDWG) >2.5 kg and urea level >100mg/dl. The results of the current study revealed that no one of the sample had abnormal k level, at six months follow up in relation to phosphorus (21.82%) of the study sample represents abnormal po4 level at six months follow up while (74.55 %) represent abnormal urea level. In the present study, most of the patients demonstrated adherence to potassium in which serum potassium level among the study sample demonstrate about three third (86.67%) of the study sample their potassium level within acceptable limit pre program (at base line), while (100.00 %) of the studied sample having normal potassium in six months follow up times. In congruent with the present result the study of Chan, and Zalilah (2012) in studying determinants of compliance behaviors among patients undergoing hemodialysis in Malaysia determined that Interdialytic weight gain (IDWG), serum potassium and phosphorus which have been widely used in many studies were used as indicators of fluid and dietary compliance. In view of the absence of validated international cut-off values, the existing acceptable limits used in the dialysis units were applied to identify non-adherers. Subjects were considered as dietary compliant when both serum potassium and phosphorus were within the acceptable ranges. Also; Safdar, Baakza, Kumar, and Naqvi (1995) agreed that the most frequent measure of adherence are interdialytic weight gain (IWG), serum potassium (K), blood urea nitrogen, (BUN) and serum phosphate (Po4).

Conclusion

Hemodialysis places multiple and unavoidable demands on a patient's life style, related to dialysis regimen, dietary and fluid restrictions, the requirements of multiple medications with potential side effects as well as management of multiple co-morbid conditions. Quantification of the degree of non-adherence is clearly required to understand the impact of treatment on a patient's life. To improve adherence to such patients these include promoting positive attitudes among patients and increasing their perceptions of behavioral control towards dietary and fluid adherence. Improved dietary and fluid adherence among hemodialysis patients is likely to result in reduced incidence of medical complications associated with dietary and fluid non-adherence, and subsequently reduce the CKD mortality rate.
Based on the findings of the present study, the following recommendations are suggested

Recommendations

Related to patients:
Patients with chronic renal failure need to take an active role to follow a strict dialysis treatment regimens, medication and diet advice Patients need to be supported, not blamed.

Ongoing education is a must for the dialysis patient, establishment of patients' educational centers in hospitals equipped by suitable related materials, medias and audio-visual aids for teaching all hemodialysis patients how to adhere to a prescribes regimen.

Design and implement an educational program for nurses to help them to provide nursing interventions to patients undergoing hemodialysis to improve their health-related issues.

Family support and education are key factors in adherence success.

Education and counseling should begin pre-dialysis to help patients identify existing coping strategies and to develop new ones.

Establishment of a hot line contact for trouble shooting of the dangerous situations that might be suddenly raised.for furthers researches

Replication of the study on a larger probability sample selected from different geographical areas in Egypt is recommended to obtain more generalizable data.

Further research should be designed with a comparison between an intervention groups and a control/usual care group both providing the same therapeutic regimen advice to capture the effect of the intervention only, without confounding factors.

Establish a multidisciplinary training unit Nephrologist, dialysis nurse and technician; include psychologist, medical social worker and a dietician working together for better patient care.

Further studies should investigate the factors contributing to patients' non-adherence to therapeutic regimen in order to develop interventions to overcome barriers. These factors include psychosocial and environmental determinants, but also biological factors affecting adherence to   therapeutic regimen.

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