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Impact of Designed Nursing Intervention Protocol for Hemodialysis Patients on Patient's Outcomes

Magda M. Mohsen [1], *Warda Y. Mohammed*[2], Neima Ali Riad[3], Gehan A. Atia[4]
1. Professor CHN. Faculty of Nursing, Menoufia University
2. Professor of Medical-Surgical Nursing-Faculty of Nursing– Cairo University Egypt
3. Lecturer of Medical- Surgical Nursing-– Faculty of Nursing- Menoufiya University-Egypt*
4. Assistant Lecture of Adult Health Nursing, Faculty of Nursing, Menoufiya University-Egypt
E-mail of the corresponding author: drnana_riad@hotmail.com

Abstract
Background: End Stage Renal Disease (ESRD) is a total or nearly total permanent kidney failure. It is the progressive and irreversible renal destruction, which is ultimately fatal without the intervention of chronic intermittent dialysis and/or kidney transplantation. This study aimed to examine the impact of a designed nursing intervention protocol for hemodialysis patients on patients' outcomes. Design: A quasi-experimental research design was utilized. A convenience sample of 60 patients undergoing hemodialysis therapy at Shebin Elkkom Teaching and University Hospitals were selected. They are divided into two equal groups matched for age, sex, educational status and co-morbidity. Tools for data collection were through a structured interview questionnaire and nutritional status assessment. The designed protocol was applied to improve the patients` level of nutritional status, and decrease the rate of complications. The tools were used for pretest before conduction of the designed protocol, immediate posttest, and follow-up at 4 and 8 months. The results of the present study revealed that:- the mean knowledge scores and mean practice scores among the study group increased immediately after the program, and continued to be high at the first and second follow-up phases. No such improvements could be noticed among the control group throughout the study phases. Statistical significant improvements in study group, fewer complications, and some improvement in their nutritional status. Conclusion, nursing care and education of hemodialysis patients are necessary to achieve fewer complications, and to improve their nutritional status. Recommendation: Application of the designed intervention is recommended in similar settings.
Keywords: Hemodialysis, Nursing intervention

1.INTRODUCTION

Chronic renal failure is gaining more attention not only in Egypt but worldwide as well. Knowing the fact that the prevalence of chronic renal failure in Egypt is one of the highest in comparison to other countries, the problem should attain utmost importance, and be put on top of the agenda in any form of medical, environmental and social reform ***(Egyptian National Kidney Foundation, 2002)***.

Chronic renal failure affects approximately 75,000 people in the United States of America, while 40 to 80 persons for every million in Europe have CRF. Meanwhile, around 264 for every one million people are suffering from CRF in Egypt ***(Barsoum, 2002)***. In more specification, according to the annual records of Menoufiya University Hospital, there were 91 cases receiving hemodialysis sessions during the year of 2006 ***(Menoufiya University Hospitals Annual Record, 2006)***.

Hemodialysis is a procedure that cleans and filters blood. It rids the body of harmful waster and extra salts and fluids. It also controls blood pressure and helps the body keep proper balance of the chemicals such as potassium, sodium and chloride ***(Klang et al., 2001)*** & ***(Smeltzer and Bare, 2004)***. Hemodialysis uses a dialyzer or a special filter to clean the blood. The dialyzer is connected to a machine. During treatment, the blood travels through tubes into the dialysis filter, which filters out wastes and extra fluids. Then the newly cleaned blood flows through another set of tubes and back into the body. The hemodialysis is done three times a week, each treatment lasts from 2 to 4 hours ***(Ronco and Levin, 2003)***.

Although hemodialysis is an effective and relatively painless medical treatment, it is not foolproof nor is it a perfect replacement for the natural kidneys. Like almost any other complicated medical treatment, hemodialysis does carry some risks and it can sometimes have some unpleasant side effects such as cramps, headache, nausea, and dizziness. The patient and the dialysis team can take steps to prevent and minimize these problems ***(Klang et al., 2001)***.

The individual with ESRD undergoes a complex treatment regimen, involving not only dialysis, but also a wide range of dietary restrictions and medications ***(Abraham et al., 2003)***. According to the Medical Nutritional Therapy (MNT), nutrition education, and counseling are essential components for effective management of the end stage renal disease ***(Burrowes , 2004)***.

2. Significance of the study

Hemodialysis has expressed educational needs for practices related to performing vascular care, in addition to

the need for a nutritional intervention. We need the collaboration and teamwork of society as media, public figures, doctors, nurses, dietitians, medical equipment technicians, social workers, and also renal patients ***(Egyptian National Kidney Foundation, 2002).***

3. Research hypotheses

1. The mean knowledge scores of the patients post intervention will be higher than those of pre intervention.
2. The mean practice scores of the study group subjects will be higher than that of the control group subjects.
3. The nutritional status of the study group subjects will show more improvement than that of the control group subjects.

5. AIM OF THE STUDY

This study was carried out in order to examine the impact of a designed nursing intervention protocol for patients undergoing hemodialysis on their outcomes as indicated by patients' knowledge, practices, complications, management, and nutritional status.

6. SUBJECTS AND METHOD

Study variables; The independent variable in this study was the nursing intervention protocol provided for the patients on hemodialysis, while the dependent variables were the patient's management of complications and nutritional status.

Design; A quasi-experimental research design was utilized.

Setting ; This study was conducted at Menofiya University Hospital and Shebin Elkom Teaching Hospitals.

Subjects; A convenience sample of 60 adult male and female patients, undergoing hemodialysis was selected. The sample was divided equally into study and control groups, 30 subjects each, with the following matching criteria: Age, Sex, educational level & Co-morbidities. The only exclusion criterion was having diabetes mellitus.

Instrumentation

1. ***Structured interview questionnaire:*** It consisted of socio-demographic and medical data. It included patient age, sex, level of education, occupation, marital status, and income. The medical data included the complaints of other diseases, previous shunt, types of ingested food as related to salt, fat, and protein intake, instructions about recommended food and their source, and whether the patient had any problems related to mastication, nausea, or digestion.

2. Nutritional status assessment: Patient's nutritional status was assessed through this tool which consisted of:

- Anthropometric measurements: height, weight, body mass index (BMI), and triceps skinfold. A non-stretch tape was used to measure height; a scale was used to measure body weight, and a skinfold caliper was used to obtain triceps skinfold thickness. Body mass index was calculated from patient weight and height according to the following equation:

$$BMI\ (kg/m^2) = \frac{Weight\ (kg)}{Height\ (m^2)}$$

The interpretation of BMI was done as follows: BMI below 18.5 means underweight, BMI 18.5-<25.0 means normal weight, BMI 25.0-<30.0 is considered overweight, and BMI 30.0 and above means obesity ***(National Institutes of Health and National Heart, Lung and Blood Institute, North American, 2000)***.

- Physical signs of malnutrition: were monitored through inspection and observation to detect clinical signs and symptoms of nutritional deficiency on skin, hair, and eyes. Laboratory studies: as hemoglobin, blood urea nitrogen (BUN), and serum creatinine.

Method

- **Approval to conduct** the study; an official letters was issued to the director of the university hospitals.
- **Protection of the human rights;** each subject was informed about the purpose, and the nature of the study. The subject was informed that their participation is totally voluntary & the confidentiality and anonymity were assured.
- **Period of study:** This study was conducted starting from 1/1/ 2006 to the end of December of the same year.
- **Tools Validity:** The tools were tested for content validity by the supervisors who are expert in medical-surgical nursing to ascertain relevance and competence & **reliability were tested**.

- Preparation of educational material related to chronic renal failure, methods of treatment (hemodialysis, peritoneal dialysis, and renal transplantation), and interventions related to patient self-care; nutrition, fluid limitation, medication intake, and care of access devices). The researcher prepared an Arabic booklet associated with pertinent illustrations to be distributed to participants.
- A pilot study was conducted on two CRF patients undergoing hemodialysis at Menoufiya University Hospital. According to its results, no significant modifications were needed in any of the data collection tools, so these subjects were included in the actual study sample.

Procedures

- A list of the names of eligible subjects was obtained from the head nurses of the selected units to obtain baseline data for the study subjects. Then, subjects were randomly assigned to the study and control groups. ***For study group subjects:***
- The investigator utilized structured interviewing in order to fill the first, second, study tools. The interview was conducted individually.
- After filling the interview questionnaire tool, each patient was examined for signs of malnutrition, and anthropometric measurements were done using the third tool. It took about thirty minutes to fulfill these measurements for each patient.
- For the theoretical part of the intervention protocol, short sessions of about 30 to 45 minutes of verbal instructions were given to each patient in the study group. The number of sessions for each patient varied according to his/her learning needs and level of understanding. It ranged between three and five sessions. These sessions covered the following:

- Information about chronic renal failure and hemodialysis, Information about nutrition as well as instructions for self-care related to disease management such as dietary restrictions, fluid limitation, medication intake, vascular access care, and self-weighing as well as Self-care management of problems such as hypotension, nausea and vomiting.
- ***Evaluation phase***: The subjects were evaluated three times after the pre-assessment. The first assessment was immediately after implementation of the intervention program. The second and third assessments were respectively on the 4^{th} and 8^{th} months after implementation of the intervention as **well as their nutritional** status.

For the control group; subjects were only subjected to the routine hospital interventions, and monitored at the same intervals as the study group ones.

7. Statistical analysis

Results were statistically analyzed using s. s. package. Quantitative variables were presented in the form of mean (x) and standard deviation (SD) and tested by Student t-test and Mann-Whitney test (nonparametric test) which is a test of significance used for comparison between two groups not normally distributed having quantitative variables.

Qualitative variables were compared using a Chi-square test (χ^2). Pearson correlation analysis was used for assessment of the inter-relationships among quantitative variables, and Spearman rank correlation for ranked ones. Statistical significance was considered at p-value <0.05.

8. Results

Table 1) show that no of statistical significance differences between study and control group subjects

Table 2) describes that all patients in the study and control groups were aware about dietary regimen. However, none of the patients in the study group had instructions about canned food and soda, compared to 83.3% of those in the control group.

Table 3) points to statistically significant differences between the two groups as regards malnutrition signs in the skin (p=0.002), lips (p=0.01), and musculo-skeletal system (p=0.007).

Table 4) shows that the anthropometric measurements had no statistically significant differences between the two groups at the pre-program phase.

Figure 1) displays that a decreasing trend of signs of malnutrition among patients in the study group (F=5.96, p<0.001). Conversely, an increasing trend is demonstrated among patients in the control group (F=2.97, P=0.03).

Figure 2. Mean weight change between sessions among patients in the study and control groups throughout the study phases

Figure 3) it is evident that there is an increasing hemoglobin level trend among patients in the study group, meanwhile, the means were stable among patients in the control group throughout the study phases.

Figure 4) shows the Mean BUN level among patients in the study and control groups throughout the study phases.

Figure 5) in the study group, the creatinine level increased immediately after the program, but has demonstrated

a decreasing trend at the first and second follow-up phases. Meanwhile, the means were stable among patients in the control group throughout the study phases.

Table 5) it indicates some stability of BMI in both groups. As regards skinfold thickness, the study group shows a steadily increasing trend, whereas the trend was decreasing in the control group.

Table 6) Shows that none of the patients in either group had satisfactory knowledge at the pre-program phase.

Table 7) as evident from this table, none of the patients in either group had adequate practice at the pre-program phase.

Figure 6) illustrates Mean knowledge score among patients in the study group, the level increased immediately after the program, and continued to be high at the first and second follow-up phases (statistically significant $F=342.75$, $p<0.001$). Meanwhile, the means were stable among patients in the control group.

Figure 7) Shows Mean practice score among studied patients**.** It shows increasing trend among patients in the study group throughout program phases ($F=26.45$, $p<0.001$). The control group has also an increasing trend, which was statistically significant ($F=21.82$, $p<0.001$).

Table (1) Distribution of socio-demographic characteristics among patients in the study and control groups

Items	Group				X^2 Test	p-value
	Study (n=30)		Control (n=30)			
	No.	%	No.	%		
Age (years):						
<50	17	56.7	17	56.7		
50-	13	43.3	13	43.3		
Range	22.0-62.0		22.0-63.0			
Mean±SD	46.1±11.6		46.2±11.1		0.004	0.95
Gender:						
Male	17	56.7	17	56.7		
Female	13	43.3	13	43.3	0.00	1.00
Education:						
Illiterate	9	30.0	9	30.0		
Read/write	5	16.7	5	16.7		
Basic	8	26.7	8	26.7	--	--
Secondary/ University	8	26.6	8	26.6		
Marital status:						
Married	24	80.0	20	66.7		
Unmarried	6	20.0	10	33.3	1.36	0.24
Job:						
Unemployed	8	26.7	5	16.7		
Housewife	11	36.7	13	43.3		
Employee	4	13.3	3	10.0	1.25	0.74
Manual worker	7	23.3	9	30.0		
Reported monthly income:						
Insufficient	22	73.3	16	53.3		
Sufficient	8	26.7	14	46.7	2.58	0.11

Table (2) Distribution of nutritional habits among patients in the study and control groups

Items	Group				X^2 Test	p-value
	Study (n=30)		Control (n=30)			
	No.	%	No.	%		
Aware about diet regimen:	30	100.	30	100.0	0.00	1.00
Source of information given:						
Dietitian	0	0.0	24	80.0		
Doctor	30	100.	3	10.0	--	--
Other	0	0.0	3	10.0		
Instructions provided:						
Low salt	30	100.	5	16.7		
Low salt/canned food/soda	0	0.0	25	83.3	42.86	<0.001*
Followed instructions:						
No	24	80.0	8	26.7		
Sometimes	6	20.0	22	73.3	17.14	<0.001*
Reasons for not following them:						
Not important	30	100.	16	53.3		
Not feasible	0	0.0	14	46.7	18.26	<0.001*
Have problems with:						
Mastication	8	26.7	1	3.3	Fisher	0.03*
Nausea	7	23.3	0	0.0	Fisher	0.01*
Indigestion	5	16.7	0	0.0	Fisher	0.052
Number of meals/day						
3	30	100.	30	100.0	0.00	1.00
Salt consumption:						
High	21	70.0	13	43.3		
Low	1	3.3	2	6.7	4.35	0.11
Normal	8	26.7	15	50.0		
Fat consumption:						
Butter/Ghee	8	26.7	8	26.7		
Vegetable oils	10	33.3	0	0.0	12.94	0.002*
Animal fat	12	40.0	22	73.3		
Protein consumption:						
Low	27	90.0	20	66.7		
Normal	3	10.0	10	33.3	4.81	0.03*
Cooking method:						
Cooked	30	100.	30	100.0	0.00	1.00

(--) Test result not valid (*) Statistically significant at p<0.05

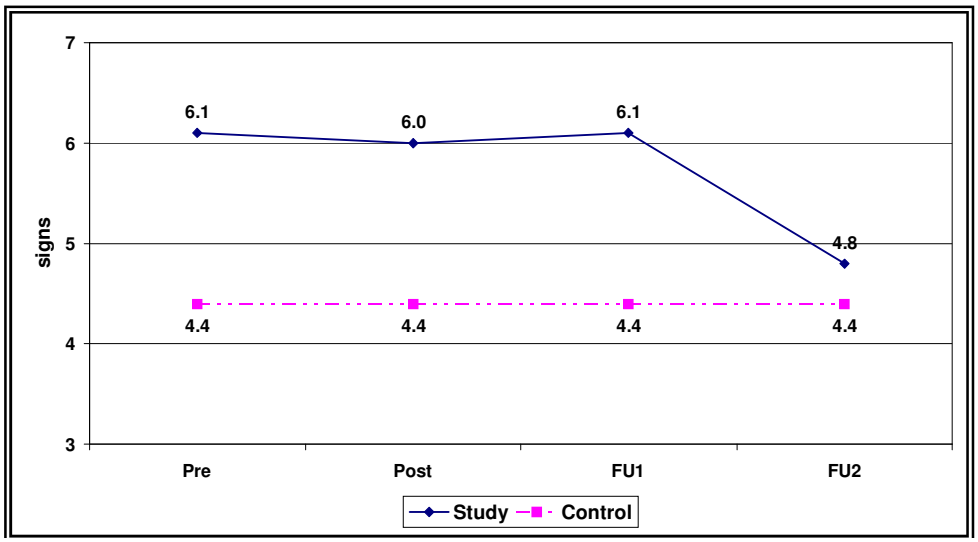
Hypothesis I: Patients in the study group will have less nutritional problems as assessed by physical examination and laboratory tests

Table (3) Distribution of pre-program signs of malnutrition among patients in the study and control groups

Signs of malnutrition in	Group				X^2 Test	p-value
	Study (n=30)		Control (n=30)			
	No.	%	No.	%		
Skin	30	100.0	21	70.0	Fisher	0.002*
Hair	16	53.3	16	53.3	0.00	1.00
Eyes	11	36.7	6	20.0	2.05	0.15
Lips	14	46.7	5	16.7	6.24	0.01*
Tongue	13	43.3	6	20.0	3.77	0.052
Gums	24	80.0	17	56.7	3.77	0.052
Nails	18	60.0	17	56.7	0.07	0.79
Musculo-skeletal system	27	90.0	18	60.0	7.20	0.007*
Cardiovascular system	29	96.7	27	90.0	Fisher	0.61
Total number of abnormal signs:						
Range	**3.0-9.0**		**1.0-9.0**			
Mean±SD	**6.1±2.4**		**4.4±2.2**		**T=2.75**	**0.008***

(*) Statistically significant at p<0.05

Figure (1) Mean number of signs of malnutrition among patients in the study and control groups throughout the study phases



Statistically significant at p<0.05

Table (4) Distribution of pre-program anthropometric measurements and laboratory findings among patients in the study and control groups.

Items	Group				X^2 Test	p-value
	Study (n=30)		Control (n=30)			
	No.	%	No.	%		
BMI:						
Normal (<25)	12	40.0	16	53.3		
Overweight (25+)	18	60.0	14	46.7	1.07	0.30
Range	20.6-30.9		20.6-29.4			
Mean±SD	25.5±2.3		24.8±2.0		T=1.22	0.23
Triceps skinfold (cm):						
Range	7.0-21.0		7.0-20.0			
Mean±SD	12.0±4.3		11.8±4.1		T=0.18	0.85

(*) Statistically significant at p<0.05

Figure (2) Mean weight change between sessions among patients in the study and control groups throughout the study phases

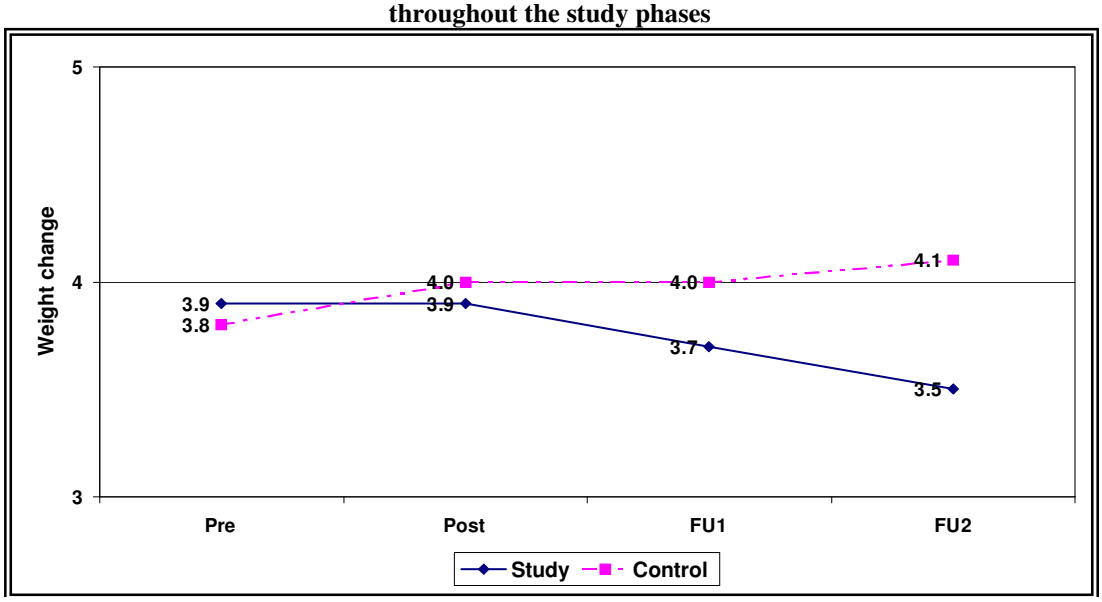


Figure (3) Mean hemoglobin level among patients in the study and control groups throughout the study phases

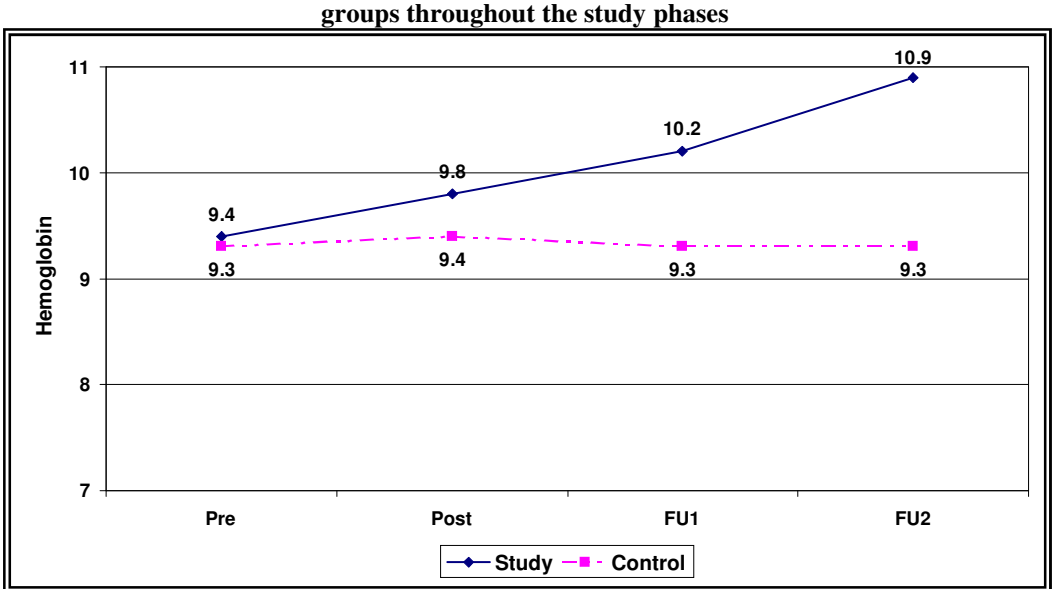


Figure (4) Mean BUN level among patients in the study and control groups throughout the study phases

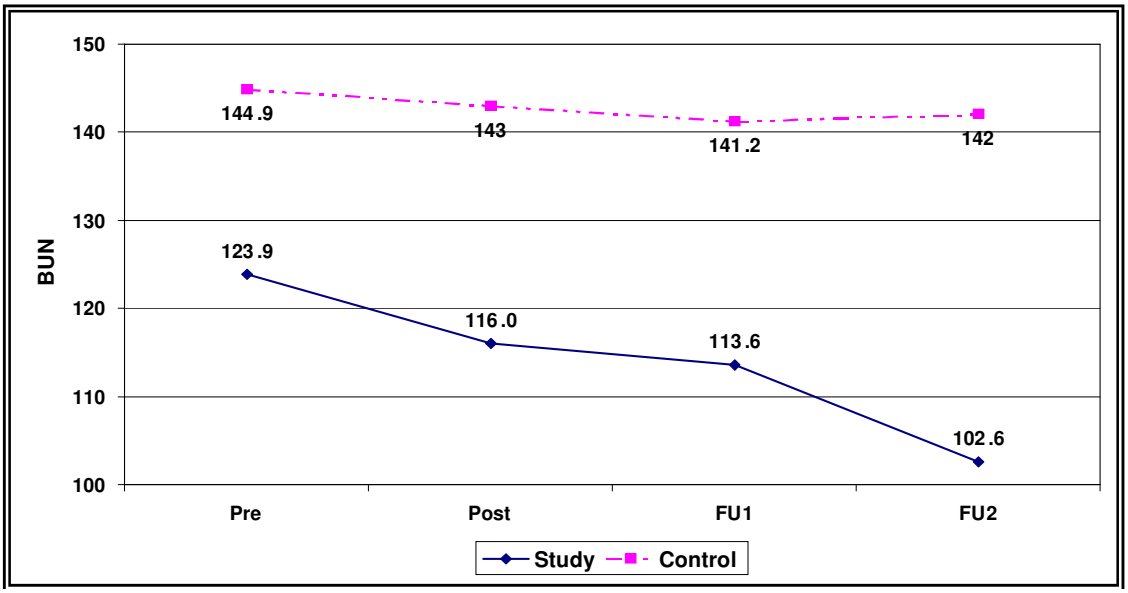


Figure (5) Mean creatinine level among patients in the study and control groups throughout the study phases

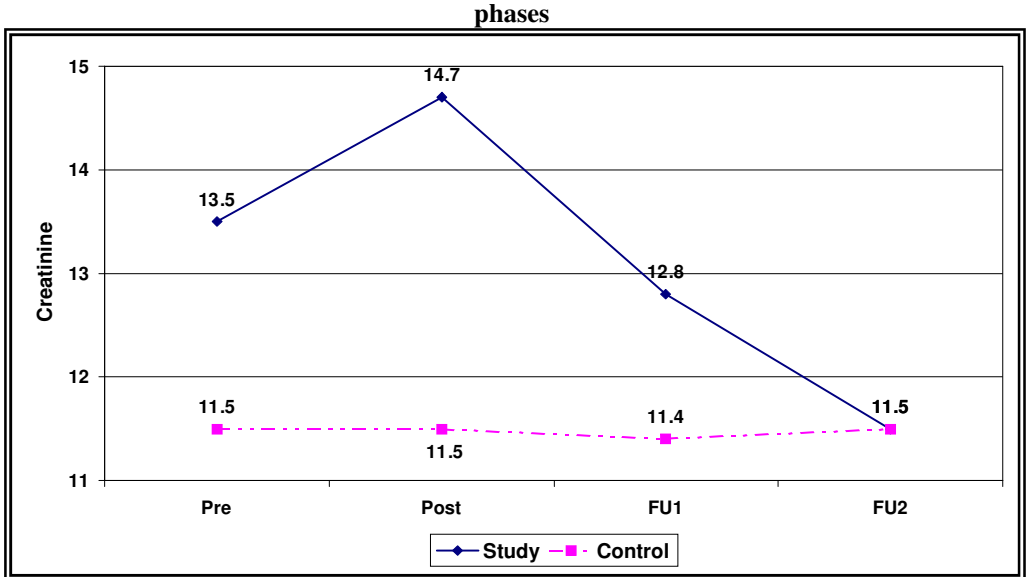


Table (5) Comparison of anthropometric measurements among patients in the study and control groups throughout the intervention program

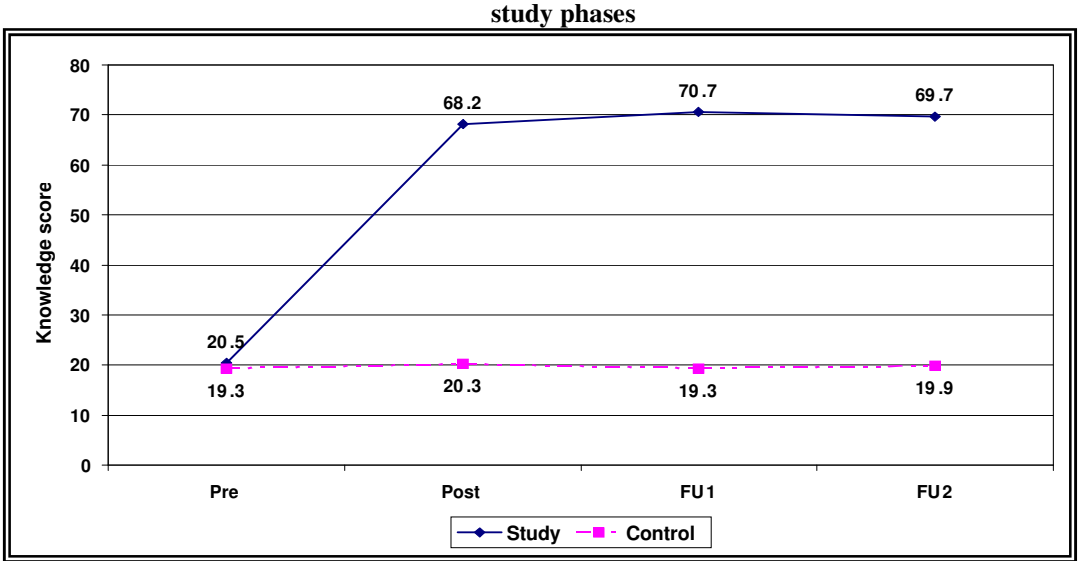
Items	Time (Mean±SD)				ANOVA	p-value
	Pre (n=30)	Post (n=30)	FU1 (n=30)	FU2 (n=30)		
BMI						
Study	25.5±2.3	25.3±2.3	25.3±2.2	25.4±2.1	0.06	0.98
Control	24.8±2.0	24.9±2.2	25.3±2.5	24.9±2.3	0.26	0.86
Triceps skinfold						
Study	12.0±4.3	12.1±4.2	12.4±4.3	12.5±4.2	0.10	0.96
Control	11.8±4.1	11.6±3.8	11.7±3.7	10.6±3.5	0.73	0.54

Hypothesis II: Patients in the study group will have higher knowledge scores, compared to control group

Table (6) Distribution of pre-program knowledge among patients in the study and control groups

Satisfactory knowledge (50%+) about:	Group				X^2 Test	p-value
	Study (n=30)		Control (n=30)			
	No.	%	No.	%		
Nutrition	11	36.7	14	46.7	0.62	0.43
Risk factors for renal failure	0	0.0	1	3.3	Fisher	1.00
Complications of renal failure	0	0.0	0	0.0	0.00	1.00
Arterio-venous shunt	1	3.3	1	3.3	Fisher	1.00
Medications	30	100.0	30	100.0	0.00	1.00
Body weight in hemodialysis	0	0.0	0	0.0	0.00	1.00
Fluid balance with hemodialysis	0	0.0	0	0.0	0.00	1.00
Total knowledge:						
Satisfactory (50%+)	0	0.0	0	0.0		
Unsatisfactory (<50%)	30	100.0	30	100.0	0.00	1.00

Figure (6) Mean knowledge score among patients in the study and control groups throughout the study phases

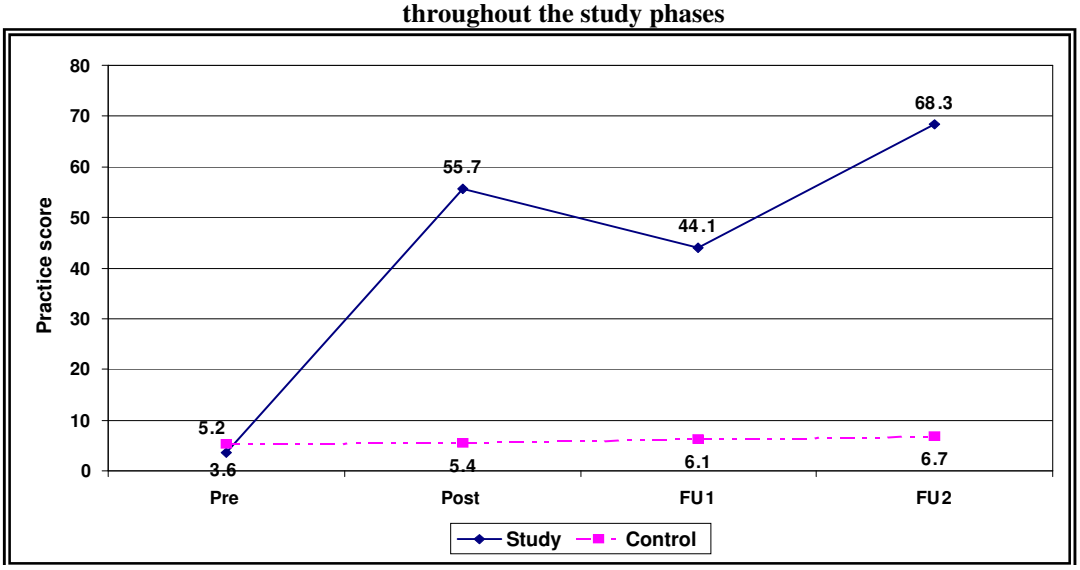


Hypothesis III: Patients in the study group will have higher practice scores, compared to control group

Table (7) Comparison of pre-program practice among patients in the study and control groups

Adequate practice (50%+) related to:	Group				X^2 Test	p-value
	Study (n=30)		Control (n=30)			
	No.	%	No.	%		
Fluid intake	0	0.0	0	0.0	0.00	1.00
Management of hypotension	0	0.0	0	0.0	0.00	1.00
Management of dyspnea	0	0.0	0	0.0	0.00	1.00
Management of vomiting	0	0.0	0	0.0	0.00	1.00
Management of cramps	0	0.0	0	0.0	0.00	1.00
Management of itching	0	0.0	0	0.0	0.00	1.00
Shunt care	0	0.0	0	0.0	0.00	1.00
Weighing self	0	0.0	0	0.0	0.00	1.00
Total practice:						
Adequate (50%+)	0	0.0	0	0.0		
Inadequate (<50%)	30	100.0	30	100.0	0.00	1.00

Figure (7) Mean practice score among patients in the study and control groups throughout the study phases



9. DISCUSSION

Patients with end stage renal disease (ESRD) require continual care. Daily self-care includes managing a complex treatment regimen of dietary restrictions, fluid limitations, medications, and vascular access care. This day-to-day care is the responsibility of the client *(Abraham et al., 2003)*; *Richard, 2006).* Hence, as Ahmad et al., 2010; Burrowes (200*4)* emphasized, the importance of medical nutritional therapy, nutrition education, and counseling are essential components for effective management of the end stage renal disease. Therefore, the present study was carried out to evaluate the impact of a designed nursing intervention protocol for hemodialysis patients on patient's outcomes.

The first step in the present study was to acquire baseline data about the participating patients. Concerning the nutritional habits of patients in the study and control groups, the present study findings revealed that all of them were aware about dietary regimen. This is of major importance since patients should know the reasons of being on a nutritional therapy and know the hazards and potential complications. In contradiction with the present study findings, ***Faried (2004)*** and ***Ali (2006)*** mentioned that slightly more than half of their sample did not receive any dietary instructions. This deficiency in nutritional education was explained by the absence of an organized system for hospital staff in relation to nutrition education for hemodialysis patients.

The main source of information for both present study groups was the doctor, with little contribution from dieticians and others in the control group. The finding is in agreement with ***Ali (2006)*** who stated that the main source of information about diet was the doctor, with 21.4% of the patients informed by dietitians. Similarly, ***Elshikh (2003)*** found that the doctors were the source of information, with a low percentage of the patients (13.7%) having been informed by other patients. This discrepancy may be due to the low contribution of the dietitians in the Egyptian hospitals that attributed to shortage in their numbers, as well as their pre-occupation with administrative and financial issues in the kitchen, such as purchases and cooking, rather than with their main role in patient education. In the researcher's opinion, this constitutes a missing step in the cycle of patient education about diet. The nurse should have an important role in this cycle, as she is the person who has close contact and longer time with the patient.

In relation to following dietary instructions, the present study revealed that the majority of patients in both groups did not follow the instructions, or did it sometimes. In contrast, ***Ali (2006)*** noted that about two thirds of the study sample who were aware of their therapeutic diet followed it. This discrepancy may be due to the reasons for not following those instructions were the perception that they were not important, and not feasible.

In relation to dietary problems, the present study demonstrated that the most common problems were mastication, nausea, and indigestion, and these problems affected almost less than one-fourth of the patients. They were more common among study group patients, compared to the control group. These findings were inline with ***Lutf Alharfant (2005)*** who reported that 18% to 36% of the studied sample suffered from nausea and vomiting.

The present study intervention first hypothesized that the educational program will induce an improvement in the uremic symptoms among study group patients, compared to the control group. The results of the study revealed decreases in the mean uremic scores among patients in the study group throughout the program phases. Conversely, these mean scores increased among patients in the control group. This results was consistent with

The National Kidney Foundation Clinical Practice Dialysis,***2001)*** stated that that the nutritional status should be evaluated at onset of hemodialysis and at regular intervals, as every third month that means nutritional status should be regularly assessed in all patients undergoing maintenance hemodialysis to monitor the effect of the treatment. These findings indicate improvement in the study group, which confirms this present study hypothesis.

Therefore, the first hypothesis tested in the present study was related to nutrition of hemodialysis patients. It was hypothesized that by the end of the intervention program, patients in the study group will have less nutritional problems, compared to the control group during regular monitoring follow-up assessments. The most common nutritional problems revealed were related to skin, lips, and musculo-skeletal system, which where all higher among patients in the study group at the baseline. The findings are in congruence with those of ***Abou Elsoud (2002) and Timby and Smith (2003)*** who highlighted that the condition of the skin, mucus membranes, hair, and nails are indicators of the nutritional status, beside the anthropometric measurements. Hence, a physical assessment can reveal existing nutritional deficiencies such as dull, dry skin, and brittle hair, which are indicators of protein energy and malnutrition.

The post-intervention findings of the present study confirmed this second hypothesis related to nutrition. Before implementation of the program, the mean total number of signs of malnutrition was higher in the study group, compared to the control group. After implementation of the program, the mean total number of signs became closer in the study and control groups, and was not statistically significant. Moreover, the mean scores of malnutrition signs had a decreasing trend among patients in the study group, and remained stable among patients in the control group. These findings are consistent with ***Ali (2006)*** who similarly demonstrated an improvement among the study group patients in relation to skin condition. These results point to improvement in the nutritional state of patients in the study group.

Because the same patients were followed-up from the pre-intervention phase throughout the post-intervention phases, any changes in their conditions could be related to management given. So, improvements of the physical examination and laboratory findings could be attributed to the intervention, including dietary counseling. According to the present study results, there was some stability of BMI in both groups, but skinfold thickness had a steadily increasing trend in the study group. Moreover, significant improvements were revealed in the levels of hemoglobin, BUN, and creatinine levels among patients in the study group. Moreover, weight change between sessions demonstrated statistically significant improvements among those patients in the study group. This results was inline with ***Abraham et al., 2003)*** who claimed that weight changes might be due to other causes such as fluid shift (edema, ascites, severe dehydration) rather than real change in the body composition. This could help the patients in controlling the fluid intake, which would have a positive effect on the general health.

The second research hypothesis; It was hypothesized that this knowledge would improve after implementation of the educational program. The study findings revealed that patients in both study and control groups had limited knowledge of renal disease and hemodialysis before the intervention. This is in congruence with ***Golper (2001)*** who reported that the majority of patients of chronic renal insufficiency have a limited level of knowledge about their condition. But after implementation of intervention program in the present study, the knowledge of the patients in the study group showed improvements, compared to the control group and compared to their own baseline. Moreover, the mean knowledge scores among these patients in the study group increased immediately after the program, and continued to be high at the first and second follow-up phases. No such improvements could be noticed among patients in the control group throughout the study phases. These findings are in line with Elhefnawy (2003) ***who*** have similarly demonstrated that both their groups were having unsatisfactory knowledge level before the intervention. However, after the intervention, the majority of the patients in the study group had satisfactory levels of knowledge, compared to only few subjects of the control groups who showed a little improvement in their knowledge. Therefore, these present study results confirm the third hypothesis that stated that patients' knowledge would improve after the intervention. This implies that the theoretical and practical sessions that were provided to the study group, were successful in improving their knowledge.

The third and last research hypothesis; It was hypothesized that that patients' practices related to hemodialysis would be higher among the study group patients after implementation of the study intervention, compared to those in the control group. The study findings revealed that, the mean practice scores among patients in the study group demonstrated an increasing trend throughout program phases, whereas the control group patients had a minimal increasing trend of a very low magnitude. This result was consistence with those of ***Elshikh (2003) and Bader (2002)*** who found a significant difference between control and study groups regarding their patients' practices scores after implementation of a protocol of care. Thus last research hypothesis was also confirmed by these present study findings trend throughout program phases.

Also the present study findings trend throughout program phases, where they followed-up from the pre-intervention phase these present study findings trend throughout program phases throughout the post-

intervention phases, any changes in their conditions could be related to management given. So, improvements of the physical examination and laboratory findings could be attributed to the intervention, including dietary counseling. According to the present study results, there was some stability of BMI in both groups, but skinfold thickness had a steadily increasing trend in the study group. Moreover, improvements were revealed in the levels of hemoglobin, BUN, and creatinine levels among patients in the study group. Moreover, weight change between sessions demonstrated improvements among those patients in the study group. This could help the patients in controlling the fluid intake, which would have a positive effect on the general health. Thus, confirming all research hypotheses by these present study findings trend throughout program phases.

10. CONCLUSION

It is concluded that chronic renal patients who were exposed to the designed nursing intervention protocol had lesser complications than the control group.

11. Recommendations

- Special attention should be given to patient education, with emphasis on help patients to take an active role in their own care.
- Collaborative work should be done between all health team members in order to help the patients to comply with the therapeutic care and increase their hope to live, and correct misbelieves to follow any instructions related to diet, or any health teaching.
- Implementation of the designed educational program in similar settings is recommended.

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