The Effect of Dietary Counselling on the Health Status of End-stage Renal Failure Patients

Ibrahim S. Hegazy*, Hanan A. El Raghy*, Shaimaa B. Abdel-Aziz*, Eman M. El Habashy*

ABSTRACT

Background: Chronic renal failure is becoming one of the most impacting diseases on the Egyptian population, alongside with cardiovascular and hepatic diseases, diabetes mellitus and cancers. Studies support the importance of dietary management on different aspects related to end-stage renal failure (ESRF) and other studies also suggest that active nutritional counselling can improve certain important biochemical parameters and fluid overload problems in patients on maintenance haemodialysis (HD). **Objectives**: To assess the effect of dietary counselling on the overall health status of ESRF patients subjected to haemodialysis, particularly their renal functions. **Design:** A pretest-posttest study was conducted through several phases; Phase 1: Pre-intervention assessment using; an interview questionnaire to collect socio-demographic, nutritional knowledge and dietary pattern data; Malnutrition Inflammation Score (MIS); Karnofsky Performance Scale (KPS) and anthropometric measurements. Phase 2: Implementation of nutritional counselling sessions communicating evidence-based practices. All patients were given one-to-one nutritional counselling over a six-month period. Phase 3: Post-intervention reassessment of patients using phase one tools. **Subjects**: A sex-stratified random sample of about 50% of all patients attending El-Harem Centre for Dialysis (82) during the period from October, 1st 2008 till March, 31st 2009 were included. Intervention participants totalled 41 ESRF patients. **Results:** In this study, 97.5 % of patients were considered mildly to moderately malnourished. Multiple malnutrition problems detected among these patients were protein-energy malnutrition, hypocalcaemia, anaemia and hyperphosphataemia. Nutritional counselling sessions resulted in statistically significant changes in the Malnutrition Inflammation Score (MIS) and Karnofsky Performance Scale (KPS) of the patients, the patients' nutrition related knowledge and to some extent their dietary practice. **Conclusion:** Providing one-to-one nutritional counselling is an effective intervention that can improve the ESRF patients' nutrition related knowledge and practice as well as their compliance to the dietary guidelines for the dialysis patients, which in turn can improve their health status and daily performance.

Keywords: dietary guideline, end-stage renal failure (ESRF), malnutrition, nutritional counselling

*Public Health and Community Medicine, Faculty of Medicine, Cairo University.

INTRODUCTION

Chronic kidney disease (CKD) is a worldwide public health problem. There is an increasing incidence and prevalence of patients with kidney failure requiring replacement therapy, with poor outcomes and high cost.[1,2] Worldwide, the reported annual incidence of end-stage renal disorder (ESRD) ranges between 34 and 200 per million population (PMP).[3] In Egypt, the incidence is 74 PMP.[4] There is an even higher prevalence of patients in earlier stages of CKD, with adverse outcomes such as kidney failure, cardiovascular disease, and premature death. Prevalence increases with age and co-morbidities as diabetes and cardiovascular disease.[5,6]

Malnutrition is common in patients with chronic renal failure (CRF). Various studies have showed signs of malnutrition in 23-76% of haemodialysis (HD) and 18-50% of peritoneal dialysis (PD) patients. Such variations in the prevalence of malnutrition may be related to factors such as age, co-morbid conditions and quality of dialysis therapy. The aetiology of malnutrition in CRF is complex and may include many factors; poor food intake because of anorexia, nausea and vomiting due to uraemia, hormonal derangements, acidosis and increased energy expenditure.[7,8]

Proper nutrition may help to reverse the wasting syndrome. Several international studies have suggested a strong association between nutrition and clinical outcome in haemodialysis patients.[9,10]

Nutritional education and counselling for patients with renal disease can be quite challenging as they play a major role in the preservation of renal function and the overall wellbeing in the renal patient. In preparation for renal replacement therapy (RRT), a consultation with the renal nutritionist to establish a diet consistent with the existing diagnosis may increase the likelihood of reducing cardiovascular

risk factors, preventing malnutrition and anaemia, and slowing the progression of renal disease, all of which can contribute to positive patient outcomes.[11]

Innovation in providing nutrition education to patients is needed by trying a variety of approaches to deliver the message: one-to-one counselling, group counselling, involvement in patient and family support groups, cooking classes, recipes with food samples, posters, videos, quizzes, friendly competitions, newsletters, and report cards. Nutrition tips are another effective way of providing a practical nutrition education message in a simple format, where patients can make one small change at a time in their food choices.[12]

Study objectives:

1. To identify predominant malnutrition problems in the study subjects of ESRF.

2. To test the effect of nutritional counselling sessions designed by the researchers on health status of ESRF patients, particularly their renal functions, and their nutrition related knowledge and practice (KP).

SUBJECTS AND METHODS

Study design:

This research is a pretest-posttest study design.

Study setting:

The study was conducted in El-Harem Centre for Dialysis (Seesy Dialysis Centre, Giza); a unit that is structurally under Health Insurance Organization. It has 12 haemodialysis machines.

Study time frame:

The study was conducted during the period from October, 1st 2008 till March, 31st 2009. Each patient was met five times over the course of the research, whereas each time the researcher spent about one and half hour in order to conduct extensive nutritional counselling and ensure patient recall of information. Discussions were interactive and patients were always given the opportunity to ask questions, give their opinions and concerns. The interviews and counselling sessions were scheduled

according to various shifts/groups, so as to allow sufficient time of at least one month for reassessment and implementation of the taught messages.

Study sample:

Sex stratified random sample of about 50% of all dialyzing patients at the above mentioned setting during the study course were included. Total number of dialyzing patients was 83 (56 males and 27 females); each patient was subjected to haemodialysis (HD) three times a week every other day.

At intervention initiation participants totalled 41 (28 males and 13 females). In phase 3 the number dropped to 37 as 2 patients died, one case was in the ICU and the other was hospitalized for an ocular operation.

Study tools and techniques:

Baseline data were collected from the studied sample using the following tools and techniques:

1. Personal information, socio- demographic

data, medical history, nutrition related knowledge and health related quality of life.

2. The Karnofsky Performance Status Scale Index (KPSI)[13] was used to assess patients' level of functional impairment; classifying them as follows: normal functioning (80–100), mild functional impairment (50–<80), moderate functional impairment (25–<50), severe functional impairment (≤ 25).

3. Nutritional assessment of the patients was based on history taking using the Malnutrition Inflammation Score (MIS).[14] Out of this score, six components were used; weight change, dietary intake, gastrointestinal (GI) symptoms, functional capacity, co-morbidity and body mass index. Each component has a score from one (normal) to five (very severe). Thus, the MIS is a number between 6 (normal) and 30 (severely malnourished); a lower score denotes tendency towards a

normal nutritional status and a higher score is an indicator of malnutrition, then scores were classified as follows: normal = 1-<6, mild = 6–<8, moderate = 8–<18, severe ≥18).

4. Anthropometric measurements including; weight, height and body mass index (BMI) were recorded. According to WHO cut-off scores for BMI, patients were classified into 5 classes; underweight (<18.5), normal (18.5-24.9), overweight (25.0-29.9), obese (30.0-39.9), morbid obese (> 40). [15]

5. Dietary pattern of the patients was taken by the 24-hour recall form. [16] Analysis of the patients' 24-hour recall was done based on recommended daily allowance of the dietary food guide pyramid. [17] For simplicity of data analysis, patient's dietary intake was classified into five classes using cut-off levels: unsafe (≤ 50%), needs improvement (50%-75%), accepted (75%- 100%), normal (100%-120%), unaccepted (≥ 120%).

6. Fluid intake of the patients was determined by the ultra filtration rate (UFR) of the patients' dialysis machines. It has two classes: accepted (UFR <0.4 L/h) and unaccepted (UFR >0.4 L/h).

7. Biochemical parameters including urea, creatinine, calcium, phosphorus and haemoglobin were collected from patients' records as they are conducted each month for all patients by the dialysis centre.

Study implementation:

The study was conducted through three phases:

Phase 1: Pre-intervention data collection

Primary data were collected through using the above mentioned tools and techniques.

Phase 2: Nutritional counselling

Nutritional counselling was conducted through communicating evidence-based practices. After identification of malnutrition problems from the previous phase, all the patients were given nutritional counselling

by the researcher in the form of one to one counselling (personal mentoring). Healthy eating habits were explained in reference to the renal failure guidelines, and several messages about the importance and the methods to keep healthy diet were delivered.

Tools used in counselling Sessions

Nutrition guidelines table for renal failure[2] showing different types and quantities of food categories and the importance of each were used.

Nutrition education messages included in this study stressed the eating habits that need to be emphasized or changed, for example; importance of fluid restriction and restricted salt intake.

Each counselling session involved the use of a laptop computer showing slides with nutritional messages, animation showing the harm of fluid restriction and printed materials with all messages were distributed at the end of each session to the patients, doctors and nurses.

Important general diabetic information

printouts were also distributed to diabetic ESRF patients to emphasize the importance of controlling diabetes.

Education sessions and content

The educational messages were delivered to the sample on individual basis, whereas each session lasted for about one and half hour. Healthy eating habits were explained with referral to the renal failure guidelines[2] and different messages about the importance and the methods to keep healthy diet were delivered.

Important advices helping the patient in his daily life were delivered such as; tips regarding how to minimize thirst sensation, others for how to exchange salt in preparing food with a list of herbs to give a nice taste as well, and for how to eat raw green spinach in salads to make use of it's nutritional value as it is not recommended to be eaten cooked.

Weights, amounts and volumes of food items were considered complex, and accordingly supportive simplified equivalent food serving sizes (such as cup, spoon,

etc) were also given.

Follow-up of the patients was important as the patients were asked at the beginning of each new session to give the researcher additional feedback about their eating habits, whether they started to adopt change or not and the difficulties they were facing to undergo that change. Sometimes an additional telephone follow-up call was done.

Phase 3: Post-intervention assessment

Reassessment of the study participants was conducted one month after program termination using the same tools and techniques applied before initiation of counselling sessions.

Data analysis

Data were entered and analyzed using The Statistical Package for Social Sciences (SPSS-16). Descriptive statistics such as frequency, percentage, arithmetic mean and standard deviation were used. Comparison between pre- and post-assessment data was done using the McNemar test for qualitative variables and paired student t-test for quantitative variables.

Ethical issues

The study was conducted after explaining to the participants the steps of the study and its objectives. Only those who agreed were included. Verbal consents were obtained from all the participants in the study according to Helsinki decelerations of biomedical ethics.[18]

RESULTS

This study included 41 patients; 13 females and 28 males; where male to female ratio was about 2:1. The age of the studied population ranged from 27 to 75 years with a mean of 51.7 ± 12.6 years. Table 1 shows socio-demographic characteristics of the sample, where 43.9% of them were illiterate, the majority of the sample (70%) were not working and 92.7% were married. There was a balanced distribution of the sample between smokers (53.7%) and non smokers (46.3%).

The majority of the sample were suffering from Hypertension (90.2%); 43.9% had Hepatitis C virus; 17.1% had Diabetes Mellitus; 9.8% had cardiovascular disease;

while only 4.9% had Bilharzias is. Duration of dialysis was more than 2 years in 70% of the patients. There was first degree family history of ESRF in 9.8% of the patients (table 2).

Table 1. Socio-demographic characteristics of the studied ESRF patients (n=41)

Variables	No.	(%)
Sex		
Male	28	68.3
Female	13	31.7
Age$^{\alpha}$		
≤ 50 years	17	41.5
> 50 years	24	58.5
Residence		
Rural	13	31.7
Semi urban	10	24.4
Urban	18	43.9
Education		
Illiterate or read and write	18	43.9
School education	16	39.0
University or higher	7	17.1
Current working status		
Not working	30	73.2
Working	11	26.8
Marital status		
Single	3	7.3
Married	38	92.7
Smoking		
Non smoker	19	46.3
Smoker	22	53.7

ESRF, end-stage renal failure
$^{\alpha}$Mean age = 51.7 ± 12.63, minimum = 27, maximum = 75

Table 2. Clinical background of ESRF patients (n=41)

	No.	(%)
Past medical condition$^{\alpha}$		
Hypertension	37	90.2
Diabetes Mellitus	7	17.1
Hepatitis C virus	18	43.9
Cardiovascular disease	4	9.8
Bilharziasis	2	4.9
Multi-Systemic Disease	1	2.4
Duration of dialysis		
< 2 years	12	29.3
≥ 2 years	29	70.7
Family history of ESRF	4	9.8

ESRF, end-stage renal failure
$^{\alpha}$Multiple responses were reported

Figure 1 demonstrated that the commonest three symptoms associated with ESRD were bleeding tendency (98%) poor wound healing (93%) and bone trouble (80%).
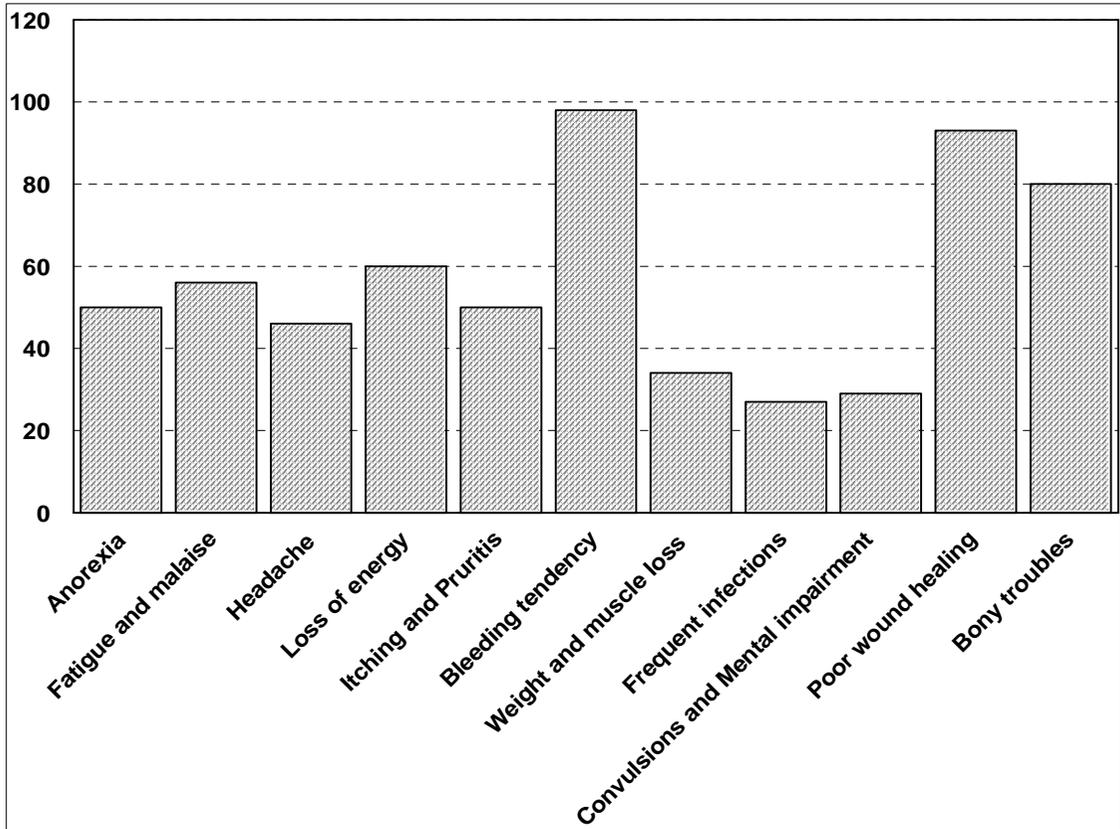

Figure 1. Distribution of the sample by common symptoms associated with ESRD

Participants' pre-intervention nutritional background and dietary profile is illustrated in Table 3. It is clear that, 29.3% of the sample had received nutritional sessions, on an occasional basis by doctors on dialysis. However, the majority (90.2%) of the sample knew nothing about nutritional assessment methods.

Analysis of the patients' 24-hour recall based on the recommended daily allowance of the dietary food guide pyramid indicated that, one third of the sample (34.1%) needed

improvement in their protein intake. Acceptable dietary intake of sodium, potassium and phosphorous was detected in 12.2%, 17.1% and 14.6% of the patients respectively. Whereas, 20% of the sample suffered from unsafe caloric intake and needed improvement, 90.2% of them had an unaccepted fluid intake (Table 3).

Table 3. **Distribution of the studied ESRF patients according to the pre-intervention nutritional background and dietary profile**

Variables	No. (n=41)	(%)
1. Receiving nutritional sessions	12	29.3
2. Knowledge of nutritional assessment methods	4	9.8
3. 24-hour recall analysis:$^{\alpha}$		
a. Protein intake:		
Unsafe	5	12.2
Needs improvement	14	34.1
Accepted	8	19.5
Normal	4	9.8
Unaccepted	10	24.4
b. Sodium intake:		
Unsafe	14	34.1
Needs improvement	9	22.0
Accepted	5	12.2
Normal	4	9.8
Unaccepted	9	22.0
c. Potassium intake:		
Unsafe	3	7.3
Needs improvement	7	17.1
Accepted	7	17.1
Normal	3	7.3
Unaccepted	21	51.2
d. Phosphorus intake:		
Unsafe	19	46.3
Needs improvement	9	22.0
Accepted	6	14.6
Normal	3	7.3
Unaccepted	4	9.8
e. Caloric intake:		
Unsafe	8	19.6
Needs improvement	9	21.9
Accepted	15	36.5
Normal	4	9.7
Unaccepted	5	12.2
4. Fluid intake^{b}:		
Accepted (UFR< 0.4 L/h)	4	9.8
Unaccepted (UFR> 0.4 L/h)	37	90.2

$^{\alpha}$ EDRF 24-Hour recall: for the interpretation of this classification see methods
^{b} Fluid intake: Mean ± SD = 0.9 ± 0.3

Table 4 shows comparison between the pre and post-intervention nutritional knowledge and practice of the studied sample. Results revealed that the rate of patients who did not know how malnutrition can affect ESRF patients' health status during the pre-intervention phase (82.9%) dropped to 5.4% during the post-intervention phase. Patients who recognized how far this relationship can worsen the condition increased from 2.4% to 83.3% post intervention.

There was an observed improvement in patients' knowledge after the intervention as 75.7% of them mentioned the right amount of fluids that should be taken every day compared to 9.8% before the intervention. A significant higher percentage of the patients

(75.7%) could illustrate different proteins of high biological value after receiving the nutrition counselling sessions. Also, the percentage of patients starting to practice healthy eating habits had significantly improved from 48.8% during the pre-intervention phase to 78.4% during the post-intervention phase (Table 4).
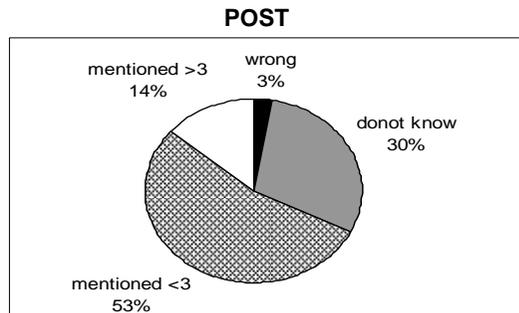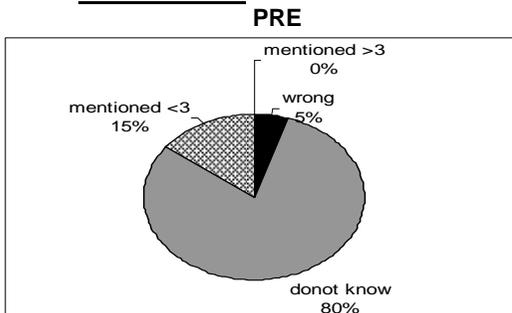
There was significant improvement in patients' knowledge as regards different food items rich in some minerals as shown in figure 1. Post intervention data revealed that the percentage of patients who mentioned more than three food items rich in potassium increased by five folds, in sodium increased by 8% and in phosphorous 16% compared to only 7% during the pre-intervention phase.

Table 4. Comparison between the pre- and post-intervention response of the studied patients as regards their nutritional knowledge and practice
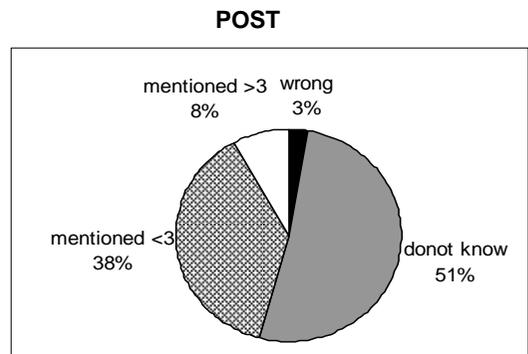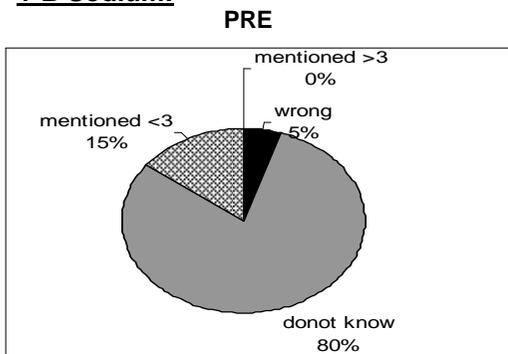
Knowledge Questions	Pre-intervention (n=41)	(%)	Post-intervention (n=37)	(%)	*P*-value
Knowledge of "Malnutrition" definition:					
- Over-nutrition:					
wrong	18	43.9	21	56.8	
Don't know	21	51.2	13	35.1	>0.05
Right	2	4.9	3	8.1	
- Under-nutrition:					
wrong	1	2.4	14	37.8	
Don't know	21	51.2	13	35.1	>0.05
Right	19	46.4	10	27.1	
- Bad quality:					
wrong	19	46.3	1	2.7	
Don't know	21	51.2	13	35.1	>0.05
Right	1	2.5	23	62.2	
How malnutrition can affect ESRF patients' health status:					
Don't know	34	82.9	2	5.4	
No relation	3	7.3	2	5.4	
Improves the condition	3	7.3	2	5.4	>0.05
Worsen the condition	1	2.4	31	83.3	
Knowledge of high biological value protein:					
Wrong	2	4.9	0	0.0	0.003
Don't know	12	29.3	9	24.3	
Right	27	65.9	28	75.7	
Knowledge of allowed amount of fluids/day:					
Wrong	4	9.8	3	8.1	>0.05
Don't know	33	80.5	6	16.2	
Right	4	9.8	28	75.7	
Practicing healthy eating habits:					
No	21	51.2	8	21.6	0.002
Yes	20	48.8	29	78.4	

Knowledge of the patients as regards three food items rich in:

1-A Potassium:

PRE	POST

mentioned >3 0%
mentioned <3 15%
wrong 5%
donot know 80%

mentioned >3 14%
wrong 3%
donot know 30%
mentioned <3 53%

1-B Sodium:

PRE	POST

mentioned >3 0%
mentioned <3 15%
wrong 5%
donot know 80%

mentioned >3 8%
wrong 3%
mentioned <3 38%
donot know 51%

1-C Phosphorus:

PRE	POST

wrong 2%
mentioned >3 7%
mentioned <3 49%
donot know 42%

mentioned >3 16%
wrong 0%
donot know 27%
mentioned <3 57%

Wrong
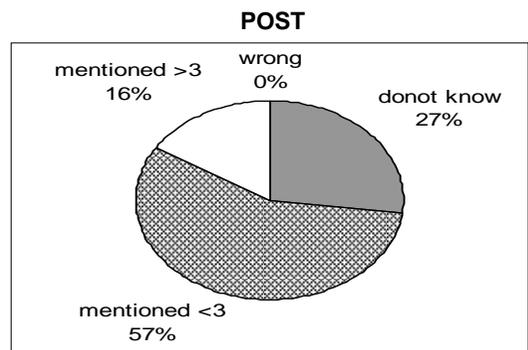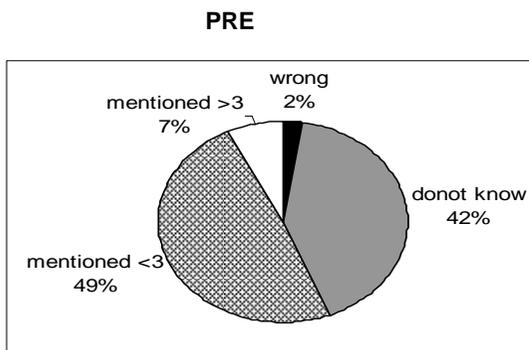Don't know
Mentioned <3
Mentioned >3

Figure 2. Comparison between patients as regards their knowledge related to food items rich in potassium, sodium and phosphorus before and after intervention

By comparing pre- and post intervention biochemical parameters of the studied sample, table 5 indicates significant statistical differences in the levels of creatinine, urea, calcium and phosphorus.

Nutritional assessment of the patients using KPS and MIS was done before and after the intervention. In Table 6 post- intervention data demonstrated a significant higher KPS mean score (78.1 ± 9.9) compared to 70.5 ± 8.5 during the pre-intervention phase. Pre and post-evaluation detected that patients within the normal band increased from 22% to 78.4%, while the mild band decreased from 73.2% to 18.9%.

Table 5. Comparison between mean and SD of biochemical parameters of renal functions in the studied ESRF patients before and after the intervention

Biochemical parameters	Pre-intervention (n=41) Mean ± SD	Post-intervention (n=37) Mean ± SD	*P*-value
Creatinine (mg/dl)	9.6 ± 3.2	8.3 ± 2.8	<0.001
Urea (mg/dL)	141.6 ± 39.8	128.0 ± 38.3	<0.031
Calcium (mg/dL)	7.5 ± 1.1	6.8 ± 0.9	<0.002
Phosphorus (mg/dL)	4.8 ± 1.6	4.4 ±1.5	>0.05
Haemoglobin (g/dl)	10.7 ± 2.3	11.4 ± 2.1	>0.05

ESRF, end-stage renal failure; SD, standard deviation

Table 6. Comparison between mean and SD of the pre- and post-intervention KPS scores and MISs of the studied patients

Variables	Pre-intervention		Post-intervention		*P*-value
	n=41	(%)	n=37	(%)	
KPS[α]					
Normal	9	22.0	29	78.4	
Mild	30	73.2	7	18.9	<0.001
Moderate	2	4.8	1	2.7	
Mean ± SD	70.5 ± 8.5		78.1 ± 9.9		
MIS[α]					
Normal	1	2.5	3	8.1	
Mild	37	90.2	34	91.9	<0.001
Moderate	3	7.3	0	0.0	
Mean ± SD	4.6 ± 1.9		3.1 ± 1.7		

[α]KPS, Karnofsky Performance Scale; MIS, Malnutrition Inflammation Score; SD, standard deviation
* No cases were found within severe bands on KPS or MIS.

Concerning MIS, we noticed that the majority of the patients were classified in the mild band pre and post-intervention. But those within the normal band increased from 2.5% to 8.1%, the moderate band decreased from 7.3% to nill after the intervention. And the average MIS during the pre-intervention - phase (4.6 ± 1.9) was statistically significantly different from that during the post-intervention phase (3.1 ±1.7), p-value <0.001.

DISCUSSION

It is well documented that malnutrition is a major co-morbid condition in patients with ESRD. Various studies stated that malnutrition is an evident problem in 40-50% of patients with ESRD, which compromises the prognosis.[11,19,20]

Nutritional status is an important predictor of outcome in ESRD patients on maintenance HD. Assessment of the nutritional status needs a systematic nutritional evaluation based on anthropometric, laboratory and clinical parameters from which a malnutrition score can be calculated.[21]

Medical nutrition therapy (MNT), nutrition education, and counselling are essential components for effective management of ESKD. Early nutritional intervention is thought to play a major role in the preservation of renal function and the overall wellbeing in the renal patient.[11,22]

Based on the above mentioned facts, the current research was carried out aiming at revealing the effects of the dietary counselling on improving the health status of dialysis patients.

Out of a total of eighty-three patients at El-Harem Centre for Dialysis, forty-one were enrolled in this study; the mean age of patients was (51.7±12.6) years. Previous national studies in Egypt found a mean age of (43.0± 17.7) years in 1987 [23] and a mean of 45.6 ±14.2 years in 1999.[24] The increasing mean age of ESRD patients in Egypt reflects the universal trend of dialysis patients living longer due to improving health care system.

The mean age of ESRD patients in Egypt

is lower than that of Latin American countries (50.5 years) and The European Dialysis and Transplant Association (EDTA).[25,26]

In the present work, 43.9% of the sample were illiterate and 56.1% were educated (17% were university graduated), so any planned messages had to address different levels of education. This is similar to a study done in Yemen 2004[20] to assess the nutritional status of ESRF patients. It showed that 36% were illiterate and only 10% were university graduated out of 50 patients sample. Another study done in Saudi Arabia 2004[27] showed that 60% of the patients were illiterate.

Our study shows that 90% of the patients were suffering from hypertension and 17% from diabetes mellitus, which are considered the two major risk factors of renal failure.

These findings are in line with other studies reporting that the most common risk factors of kidney failure are diabetes mellitus and hypertension that together account for almost 69% of the new cases.[2,6]

Also these findings were consistent with another national study reporting that hypertension is responsible for 28% of cases of ESRD in Egypt in year 1996[24], and for 22% in year 2001[28], and 30% of a sample in a study carried out on ESRD patients in Yemen.[20] These high rates coincide with that reported in the USA, Japan, Germany and other European countries.[26]

The current study has found that hepatitis C antibodies were positive in 44% of the patients. This is in agreement with another study done in 1999 [24] reporting that 49.1% of ESRD patients in Egypt had hepatitis C positive antibodies which might be probably due to contaminated dialysis machines.

In the present study, 97.5 % of the patients were considered mildly to moderately malnourished and only 2.5% were well nourished as indicated by The MIS for malnutrition. This finding is in agreement with the study done in Yemen reporting that 70%

of ESRF patients had moderate malnutrition and 20% were severely malnourished. [20] Also some international figures showed that, up to 76% of maintenance HD patients were malnourished.[7]

On the other hand, several studies concerning nutritional assessment of ESRF patients reported lower figures. In 2004 a study results showed that among the 43 HD patients of the study sample, 46.6 % had malnutrition. [29] Also in 2007, a study done in Iran showed that 40.7% of the study population had malnutrition out of fifty-four patients population.[10]

The higher percentage of malnutrition reported in the current research compared to others may be explained by the fact that our studied patients showed a very poor level of nutritional knowledge.

The poor nutritional status of HD patients is the result of several interrelated factors. Apart from the catabolic effect of dialysis, nutrients loss due to dialysis, and uremic toxicity, there are several co-morbid conditions that may also contribute to malnutrition including chronic infection and superimposed diseases that result in anorexia and inadequate food intake.[30]

It was indicated from the present study and from another study done in Iran[10] that almost all the patients were suffering from symptoms related to sequelae of malnutrition such as fatigue and malaise, headache, weight loss, muscle wasting, frequent infections, impaired wound healing and bony troubles. For example, 80% of the patients were complaining of bony pains and arthralgia. This finding matches a national study done in 2004 where all the fifty studied patients were suffering of bone pains and arthralgia [20] and with another international study done in 2006 where a disturbance in bone and mineral metabolism known as "renal osteodystrophy" was found to be common among ESRD patients.[31]

Analysis of the data related to the patient's nutritional knowledge and practice

indicated improvement in their dietary healthy eating habits, 51.2% of the sample were not following any dietary instructions before the intervention and they decreased to 21.6% after the intervention. Similarly, another study done in Egypt illustrated that 58% of the study sample were also not following dietary instructions.[20]

This may be explained by the fact that 29.3% of our patients had received previous nutritional education sessions that was not on a regular basis.

It was obvious that 43% of the study sample were not following dietary regimen due to appetite issues, 38% due to ignorance, 14% due to social issues, and only 5% due to financial issues. So different educational tips and ideas were given in the counselling sessions to help patients with the social, appetite and financial issues, and to raise their nutritional knowledge and clarify related misconceptions.

Findings of the present work provide an evidence for positive effects of the nutritional

counselling intervention where a statistically significant improvement was observed between the pre- and post-intervention assessment as regards patients' nutritional knowledge about allowed amount of fluids per day and their compliance to it, proteins of high biological value, knowledge of foods rich in sodium, phosphorus and potassium and their risky increase in their bodies.

Patients with ESRD are better to be on mild degree of protein restriction (0.8-1.0 gram/kg) than severe restriction (0.6-0.3 gram/kg) as the benefit of severe restriction is marginal. However, patients who are maintained on dialysis should be on 1-1.2 gram/kg with 75% of protein from those of high quality (eggs, meat, fish, poultry and milk).[20]

Consistent results were reported by an intervention study conducted in Canada (2004)[12] in which, there were improvements in patients' nutritional knowledge, and in their salt and fluid intake after the educational program. They used an encouraging method

as a lotto draw for patients who did not exceed their recommended inter-dialytic weight. Similar to our study, they distributed nutritional tips for the patients including different dietary instructions aiming to improve patients' nutritional status.

It is well documented that nutritional status of patients on haemodialysis is affected by their nutritional status before dialysis; many patients who commence dialysis are already malnourished.[16]

Abnormal biochemical parameters are usually encountered in patients with ESRD, some of which are predictors of mortality such as high blood urea and creatinine. In the present study significant statistical decline of creatinine, urea, calcium and phosphorus was detected between the two phases before and after the intervention, and this was similar to what was reported by another study done in 2004.[20]

Nutritional counselling of these patients was an integral part of their dietary management plan and was considered a corner stone of everyday nephrological practice.

CONCLUSION AND RECOMMENDATION

Providing one-to-one nutritional counselling is an effective intervention that can improve the ESRF patients' nutrition related knowledge and practice as well as their compliance to the dietary guidelines for the dialysis patients, which in turn can improve their health status and daily performance.

Finally, the patients should receive nutritional supplementation with vitamins, minerals and recombinant erythropoietin to alleviate nutritional deficiencies and improve their general health.

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