Effect of Dietary Intervention in Patients with CKD on Hemodialysis

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ABSTRACT

BACKGROUND: Chronic Kidney Disease (CKD) is becoming a major global health concern, with growing incidence and prevalence rates around the world. Patients with End Stage Renal Disease (ESRD) are required to undergo long term Hemodialysis.

Nutrition plays a vital role in the management of ESRD Patients undergoing Hemodialysis. Diet is an important part of the treatment plan along with medications. The elements of the renal diet include obtaining adequate calories and protein while limiting certain nutrients such as Sodium, Potassium and Phosphorus. Protein requirements are higher during dialysis due to loss of proteins and amino acids lowered by dialysis,. Studies suggest that a Dietary Protein Intake(DPI) of about 1.2g/kg/d is necessary to ensure neutral or positive nitrogen balance in most clinically stable MHD patients. Dietary Intervention, like the protein sources coming from all high biological values (HBV) which include milk protein isolate/or concentrate, whey protein concentrate etc. is needed to improve their nutritional status.

Sodium and fluid intake must be strictly controlled. These recommendations tend to be individualized for each patient based on fluid gains between dialysis treatments, blood pressure control and residual renal function. By reducing the Sodium intake, the thirst sensation is decreased which may improve compliance with fluid restriction and reduce Inter Dialytic Weight Gain(IDWG). The ESPEN recommendations are 1.8-2.5g/day for sodium, for fluid -1000 ml plus urine volume.

OBJECTIVE: To study the effect of nutrition intervention in the renal parameters in patients with CKD on Hemodialysis.

METHODOLOGY: The study was conducted on 60 patients from the Hemodialysis unit of SVS Medical College Hospital (SVSMCH), Mahabubnagar. SVSMCH is a 1000 bedded hospital. Age of the subjects varies from 20 years to 60 years of both genders. All cases had clinical and laboratory evidence of chronic kidney disease. Specific Questionnaires were prepared and used to collect medical, dietary history and knowledge of the patients on food & fluid restriction. The data thus collected was computerized in a specific program developed on Microsoft Excel 2007 Software. The database so prepared was analyzed with the help of statistical analysis, t test, p test and the results were transferred to predesigned classified tables, bar diagrams and pie diagrams prepared according to the aims and objectives of the study.

RESULTS: It was found that there was no insignificant difference between control and experimental groups before nutritional intervention ($p>0.05$). The obtained data showed that the mean value of creatinine after the nutrition education program in experimental group was significantly ($p<0.05$) decreased than before Nutrition education program represented (7.5433+1.7335mg/dl vs 10.2900+1.9876mg/dl) whereas other biochemical parameters show insignificant change after the nutrition education program. Results also show prevalence of Hemodialysis is more at the age of 51 + years. The number of male received Hemodialysis was higher than female,

CONCLUSION: The above parameters indicate that there is an urgent need for Dietary Intervention using Nutrition Education Program for improving knowledge and skills in Nutritional practices of Hemodialysis patients towards their disease and Dietary Management to improve their nutritional status which includes weight recording, diet, exercises and lifestyle changes. Therefore nutritional counseling by qualified dieticians should be mandatory in renal units as part of the medical therapy management to the nutritional status of HD patients.

KEYWORDS: Chronic Kidney Disease (CKD), Hemodialysis (HD), Dietary Intervention (DI), The National Kidney Foundation (NKF), Disease outcome Quality Initiatives (DOQI), Malnourished Hemodialysis (MHD), European Society for Clinical Nutrition and Metabolism (ESPEN), End Stage Renal Disease (ESRD), European Best Practice Guidelines for Renal Transplantation (EBPG), SVS Medical College Hospital (SVSMCH).

Introduction

Kidneys are the principal organs which perform the important job of filtering the blood. Every day, the kidneys process about 200 quarts of blood to filter and excrete about 2 quarts of waste products and extra water (NIDDK/NKF). If the kidneys did not remove the wastes, they would build up in blood and cause damage to the body. Malnutrition is usually defined as poor nutritional status resulting from poor nutrient intake in patients with CKD and especially in those undergoing maintenance dialysis, the so called uremic malnutrition1.

CKD is becoming a major global public health concern, with growing incidence and prevalence rates around the world. Nutrition plays a vital role in the management of patients with CKD, especially ESRD patients. Hemodialysis (HD) is an effective modality of treatment for ESRD patients, however management of ESRD patients maintained on dialysis is very difficult. Moreover quality of life among patients under treatment of HD is low, which affects their lifestyle.

There are, however, a myriad of nutritional issues affecting these patients, including a restrictive diet, malnutrition, and hypo-albuminemia. Diet is an important part of the treatment plan, along with medications and fluid restriction. Along with the restrictive diet, many patients have malnutrition, wasting and inflammation which can significantly impact their nutritional status,

energy, and protein stores and needs, and quality of life.

Nutrition Intervention is needed for many patients to help meet their needs and improve their nutritional status. With all of the dietary challenges facing dialysis patients and the high prevalence of malnutrition, nutrition support is often needed.

EBPG recommends dietary intervention for malnourished hemodialysis patients2. Dietary counseling and continual monitoring is vital. Regular dietary counseling is an important part of the overall nutritional management of MHD patients3.

Dietary counseling should be conducted by qualified dietitians to help patients understand their diet, overcome obstacles, and implement early intervention to prevent nutritional inadequacies and address malnutrition. Research has shown that frequent nutritional counseling by trained dietitians leads to improved serum albumin, even in the presence of chronic inflammation4.

It was shown that MHD patients received only 80% or less of recommended intake when hospitalized over 1 week5 malnutrition can start or deteriorate in the hospital. Therefore, early and aggressive intervention from the start of hospitalization should be initiated within 3 days of referral, with a daily follow up for high, and weekly follow-up for low risk patients2.

Materials and Methods

Patients and Study Design

This was an intervention study to evaluate the effect of dietary intervention in patients with CKD among hemodialysis patients. The study was carried out in the Hemodialysis Center, Nephrology Unit in SVS Medical College Hospital. Complete coverage of all ESRD patients on regular hemodialysis and dialyzed at the Hemodialysis Center in SVS Medical College Hospital. Participants were chosen from the patients who fulfilled following inclusion criteria: (ESRD patients on regular HD (three times weekly), dialyzed four hours per session, Patients, who dialyzed for at least 3 months, both genders, from 20 years to 60 years of age, consent given for participation in the study, Absence of active underlying disease (eg. collagen vascular disease), Absence of active infection(free from infections and inflammations) and not Hospitalized during the month preceding the study).

Among the 129 chronic renal failure patients who were on HD treatment and dialyzed at Hemodialysis Center in SVS Medical College Hospital, during the study period, 120 fulfilled the inclusion criteria and were enrolled in this study. The patients were divided into 2 groups: test group (n=60) and control group (n=60)

Method of data collection

Data was collected on day one for each patient (baseline), during study period and after intervention. All cases had clinical and laboratory evidence of chronic renal disease. The medical records of the patients were reviewed by the researcher for co-morbid conditions and medical history of the

participants. This was examined to check the presence of chronic diseases such as DM, HTN, IHD, hepatitis profile, duration of the problem, treatment, duration on dialysis(per months), number of dialysis sessions per week and duration of dialysis in hours. The medical records were reviewed for all participants (test group and control group) at baseline study and at every 2 months for biochemical results. Specific questionnaire was used to collect data (on baseline) through direct interviews by the researcher. Each subject was interviewed with a structured questionnaire during their dialysis session. It was used to collect medical, dietary history and knowledge of the patients.

Nutritional Status Assessment

Intervention: Sixty HD patients who were included in the study as a test group received conventional nutritional counseling and individual meal plan to achieve adequate protein and calories intake. Monitoring was done during 3months of follow up. The individual meal plan was designed and explained to patient and their families by the following ways:

Educational lecture: Educational lecture was given exclusively to the test group. It was presented by the researcher to the patients and their families during their dialysis session to educate the patients and their families on the nutritional needs to provide appropriate food with adequate calories and protein to the patients.

Presentation included all the important information needed to be known by ESRD patients on HD. It was concentrated on the elements of the renal diet including obtaining adequate calories while consuming increased levels of protein and limiting certain nutrients such as sodium, potassium and phosphorus and also fluid limitation. Information was provided in a simple way and was explained by pictures for more understanding with the help of flexies /charts prepared by researchers.

Pamphlets were prepared and distributed to all intervention group participants after the lecture and all the summary information that was presented was found in the sheet which the researcher called it general instruction sheet for renal patients on HD. It also includes foods to be taken, to be restricted and to be avoided.

Biochemical parameters

Serum biochemical data were obtained for the participants at the Clinical Chemistry Laboratory at SVS Medical College using standardized methods6.

Blood samples were drawn from the patients under fasting conditions just before the beginning of a dialysis session and measured all biochemical parameters like hemoglobin, RBC, calcium, phosphorus, urea, creatinine, sodium, potassium, chloride, iron etc at baseline and after 3 months of intervention period till the end of the study for all participants.

Medications

All the participants from both groups (test and control group) took their medications, such as receiving anti-hypertensive, phosphate

binders' erythropoietin, iron medications and supplementation of vitamins B, C, D during the study, as recommended by their physicians.

Follow up

Each patient was monitored during three consecutive dialysis sessions during the study period (baseline 2-3 months).

Statistical Analysis

The data thus collected was computerized in a specific program developed on Microsoft Excel 2007 Software. The data base so prepared was analyzed with the help of statistical analysis, and the results were transferred to predesigned classified tables, bar diagrams and pie diagrams & are presented as frequencies and percentages for categorical variables and mean [+ or -] standard deviation(SD) were calculated for all continuous variables. For comparison and differences between means data were analyzed using the 't' test and 'p' test. A 'p' value of less than (<) 0.05 was considered statistically significant.

Results

Demographic characteristic of the study sample

For the demographic characteristic of the study participants, test and control, males represented a higher percentage than the females. The age group distribution of subjects shows that most of the patients were in the active age group of 20-60 yrs. Results also show prevalence of hemodialysis is more at the age of 51+ years (figure2).It was also observed that men are more susceptible than women (figure1).

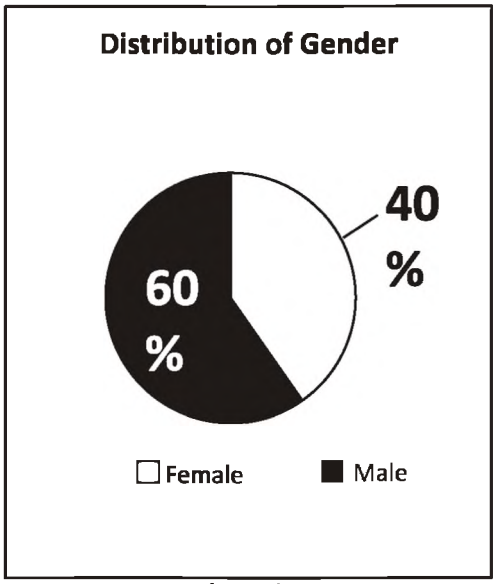


Figure 1

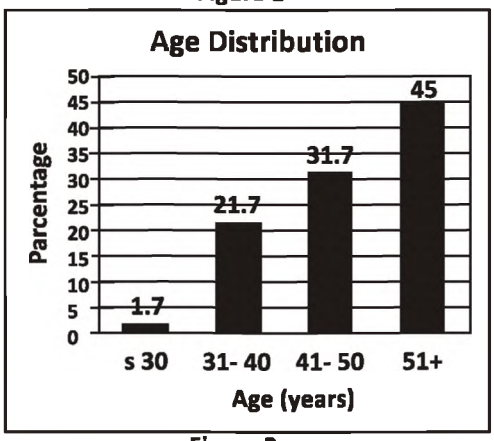


Figure 2

Biochemical evaluation of the study patients

This study shows that at baseline, there was no significant difference in the biochemical parameters between the control and experimental group before dietary intervention.(P >0.05)

The mean value of creatinine in the test group

after nutrition intervention was significantly ($p<0.05$) decreased than before nutrition intervention represented (7.5433+_1.7335mg/dl vs 10.2900+_1.9876), whereas other biochemical parameters show insignificant change after nutrition intervention. It is clearly noticed that urea, sodium, potassium, chloride and iron show insignificantly different after and before nutrition intervention programs (Table1), (figure3).

Table 1 Effects of Nutritional Intervention Programs

Parameter	Before Nutritional Education Mean ±SD	After Nutritional Education Mean ±SD	t-value	p-value
Hemoglobin	9.2667 ± 1.6828	10.3340 ± 2.1937	1.943	0.062^{NS}
RBC	2.9333 ± 0.7131	3.1833 ± 0.9487	1.231	0.228^{NS}
Calcium	7.9233 ± 0.7964	8.0900 ± 1.0330	0.658	0.516^{NS}
Phosphorus	4.9467 ± 1.6168	4.3900 ± 1.5207	1.504	0.143^{NS}
Urea	87.1667 ± 23.3859	76.9667 ± 22.8646	1.937	0.063^{NS}
Creatinine	10.2900 ± 1.9876	7.5433 ± 1.7335	7.055	0.000**
Sodium	138.0667 ± 20.8358	142.2667 ± 3.6096	1.264	0.216^{NS}
Potassium	4.2900 ± 0.6577	4.3333 ± 0.8121	0.226	0.823^{NS}
Chloride	102.1667 ± 4.4804	103.1000 ± 4.8519	1.041	0.307^{NS}
Iron	48.1333 ± 35.4699	55.6000 ± 40.7867	0.825	0.416^{NS}

NS- Non Significant (p>0.05),p<0.05 is highly significant.**

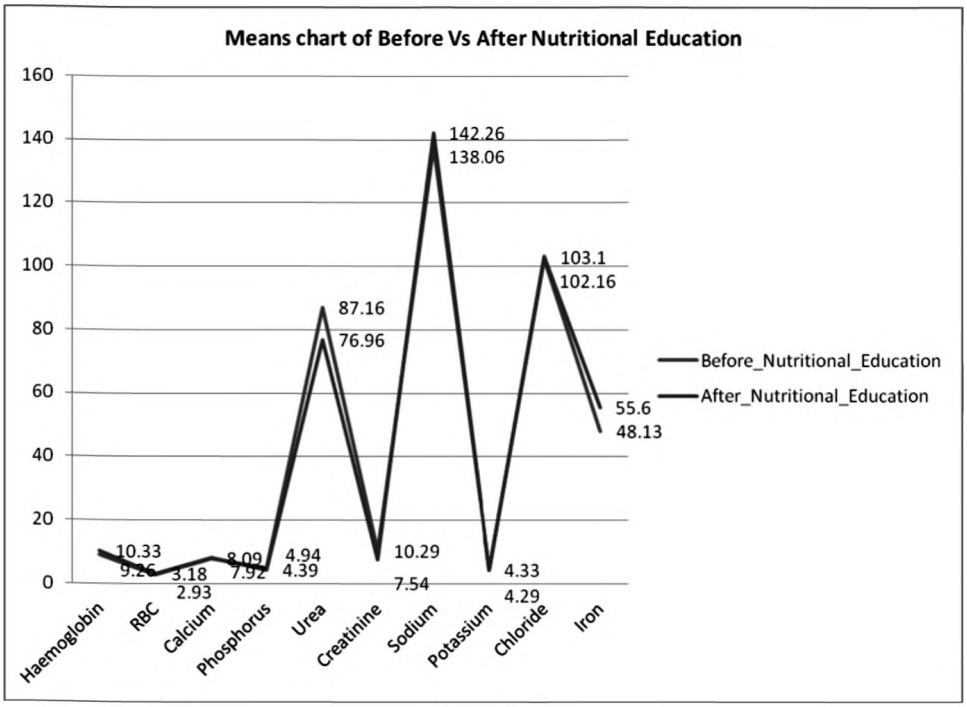


Figure 3

Discussion

NKF-DOQI7 recommended higher energy and protein intakes by MHD patients (30-35 kcal/kg/day and 1.2g protein/kg/day) because of dialysis losses of amino acids, peptides, negligible amounts of proteins, metabolic acidosis and co-morbid conditions. Thus, the dietary treatment to control the disease needs more energy and protein to meet the extra needs for body repair functions and immunity8.

Intake of energy and protein for hemodialysis patients are not reaching these recommendations, based on previous studies that re- ported lower than the recommended intake levels of energy and protein by MHD patients in Korea9, in Brazil10, and in the USA11. This is the reason why malnutrition is frequently observed among MHD patients.

In this study, biochemical parameters were similar in both groups. After 3 months creatinine levels decreased in the test group but not in the control one; the difference was highly significant within the test group (p=0.000) and between the test and control groups (p=0.000).The improved parameters in the test group can be explained by the higher intake of energy and protein, awareness of nutritional knowledge, restrictive diet, fluid restriction, salt restriction by the test group which is the result of dietary intervention showed gradual

decrease in creatinine levels during the intervention period which improved their nutritional status. Results agreed with that reported by12.

It was also noticed even though there is no significant difference, there is slow decrease in other minerals and slow increase in hemoglobin, RBC, and iron levels in the test group due to dietary intervention.

The study showed that proper nutritional counseling by a dietitian to MHD patients on the intake of diet can result in a better nutritional status.

Conclusion

This article highlights that nutrition plays a critical role in the management of patients with CKD especially ESRD patients. CKD is unique among clinical conditions in that nutrition therapy allows good control of several consequences of the disease and therefore has the same clinical relevance as other types of medical therapies13.

The results of this study shows that there is an urgent need for dietary intervention by diet counseling with nutrition education programs for improving knowledge and skills of hemodialysis patients towards their disease and dietary management to improve their nutritional status which includes weight recording, diet, exercise and lifestyle changes. Therefore, nutritional counseling by qualified dietitians should be mandatory in renal units as part of the medical therapy management to improve the nutritional status of HD patients.

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