

Effect of dietary counselling on the nutritional status of end-stage renal disease patients

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Abstract

Objective: To investigate the effect of dietary counselling on the nutritional status of end-stage renal disease patients undergoing maintenance haemodialysis.

Methods: This study was conducted at the Institute of Kidney Diseases, Peshawar, Pakistan, from November to December 2015, and comprised patients of either gender with protein energy wasting. The nutritional status assessment was based on four categories, including biochemical indicators (haemoglobin, serum albumin and cholesterol), measure of body mass index, reduced body fatness, decreased muscle mass and low protein or energy intake. Energy and nutrients intake of patients before and after counselling were estimated by 24-hour dietary recall method. SPSS 20 was used for data analysis.

Results: Of the 100 patients, 74(74%) were males and 26(26%) were females. The overall mean age was 41.45 ± 17.44 years. Dietary counselling was significantly effective in increasing the intake of energy ($p=0.010$), protein ($p=0.003$) and fats ($p=0.002$). There was significant improvement in mid-upper arm circumference ($p<0.0001$) and tricep fat fold ($p<0.0001$) after counselling. Statistically significant effect was seen in improving serum cholesterol levels ($p=0.039$).

Conclusion: Dietary counselling was found to be effective in improving the nutritional status and dietary intake of end-stage renal disease patients.

Keywords: Nutritional status, Haemodialysis, ESRD, Body mass index, Serum albumin. (JPMA 67: 1327; 2017)

Introduction

Protein energy wasting (PEW), defined as a "state of decreased body stores of protein and energy fuels", is common in patients with chronic kidney disease (CKD).^{1,2} The prevalence of malnutrition in CKD is approximately 18-75%, causing increased mortality and morbidity.^{3,4} Various factors involved in the aetiology of PEW may include poor food intake due to anorexia, nausea and vomiting due to uraemia, endocrine disorders, metabolic acidosis and increased energy expenditure.^{5,6} Moreover, restricted diet, loss of amino acids during dialysis, infection, gastrointestinal disorders, and the use of certain drugs may lead to the wasting syndrome.^{7,8}

Patients undergoing haemodialysis (HD) often die of cardiovascular events related to PEW. Markers of nutritional status, i.e. decreased body mass index (BMI) and lower cholesterol are associated with such adverse outcomes in the CKD population while in the general population they confer survival advantages leading to reverse epidemiology. Provision of adequate nutrition may help to reverse the wasting syndrome and the

associated adverse outcomes as compared to treating hypercholesterolemia, hypertension and obesity.⁹ Several international studies have shown improvement in clinical outcomes through adequate nutrition in HD patients.^{10,11}

Nutritional guidelines suggest daily energy and protein intake of 30-35 kcal/kg and 1.1-1.2 g/kg ideal body weight, respectively, to maintain nutritional status.^{12,13} It has been reported that severe reduction of energy intake <25 kcal/kg/day and/or protein intake <0.8 g/kg/day can induce PEW even when they occur for one day a week.¹⁴ Malnutrition can be halted by proper dietary counselling and adequate dietary intake with proper nutritional support. The current study was planned to assess the dietary intake and nutritional status of end-stage renal disease (ESRD) patients with an aim to detect changes in response to dietary counselling.

Patients and Methods

This study was conducted at the haemodialysis facility, Department of Nephrology, Institute of Kidney Diseases, Peshawar, Pakistan, from November 1, 2015 to December 31, 2015, and comprised ESRD patients.

The sample size was calculated using online calculator that uses the formula of Chow et al., (2008)¹⁵ by assuming the mean BMI 18.4 at 80% power with 95% confidence interval (CI).^{15,16} It was assumed that dietary counselling

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will increase BMI to 20 kg/m². The minimum sample size to detect differences in nutritional status before and after counselling was 96 with a power of 80% and 95% CI, which was rounded up to 100 patients. We assumed that the nutritional counselling will change the BMI by an effect size of at least 0.56 kg/m².¹⁷

Patients already diagnosed with ESRD and who had been on maintenance haemodialysis (MHD) for at least 3 months were screened for the study. The patients with PEW were identified using the criteria proposed by the International Society of Renal Nutrition and Metabolism (ISRNM).² Patients having serum albumin < 3.8g/dl, serum cholesterol < 120mg/dl, BMI < 23 kg/m² (dry weight), total body fat less than 10%, dietary protein intake (DPI) < 0.8 g/kg/day and dietary energy intake (DEI) < 25 kcal/kg/day were included.

Patients with liver disease, malignancy, human immunodeficiency virus (HIV) and those who had undergone a major recent surgery were excluded from the study. Patients aged <18 years or >90 years, dialysis vintage <3 months, and who were unable to answer to the questions (for instance, due to deafness or reading problems) were also excluded. The protocol for this study was approved by the institutional ethics committee. Informed consent was obtained from all participants.

The anthropometric parameters including BMI, mid-upper arm circumference (MUAC) and tricep fat fold (TFF) and biochemical parameters (serum electrolytes, serum albumin, serum cholesterol, haemoglobin) were measured at initial stage and followed by their re-evaluation at the end of 2 months. All anthropometric measurements were recorded after dialysis and biochemical measurements were taken before the initiation of dialysis. The MUAC measurement was recorded in post-dialysis patients on non-fistula arm.

Dietary intake before and after counselling was compared. A three-day food record was carried out for energy and nutrient intake assessment by using 24-hour dietary recall method as per Kidney Disease Quality Outcome Initiative (KDOQI) recommendations.¹² The three-day dietary recall included a dialysis day, a weekend day and a non-dialysis day, as suggested by the guidelines.¹² The three-day recalls were collected by interviews, during which the subjects were provided with a colour photo charts of common food and their servings in order to help them in estimating the portion sizes consumed. After that, macronutrients and energy intakes for the 3 days were calculated and then averaged before and after counselling. The dietary composition was assessed using the food composition table for the Near East.¹⁸

All study participants had been given individualised dietary counselling to achieve adequate protein and calories according to their requirement. The recommended intake was calculated using evidenced-based guidelines of the Academy of Nutrition and Dietetics Council on Renal Nutrition and National Kidney Foundation (NKF) for the purpose of individualised meal planning in this study. Dietary counselling was done by a nutritionist at the hospital.^{12,19} The diet prescription identified the type, amount and frequency of suggested foods and included any restriction and limitation or increased individual dietary components. All the participants were given individualised meal plan in the national language (Urdu) at the end of each counselling session.

SPSS 20 was used for data analysis. Descriptive statistics were used to check the data for entry errors and normality. Based on the normality of parameters, paired t-test and Wilcoxon signed-ranked test were applied to find out the significant differences in parameters before and after counselling. Standardised mean differences (Cohen's d) were also measured to assert improvement due to counselling by estimating the effect size. The effect sizes were referred to as small (d=0.2), medium (d=0.5) and large (d=0.8) based on ranges suggested by Cohen.²⁰

Results

Of the 100 patients, 74(74%) were males and 26(26%) were females. The overall mean age was 41.45±17.44 years. Primary cause of ESRD was diabetic nephropathy in 56(56%) patients, followed by hypertension 17(17%) and glomerulonephritis 15(15%) (Table-1).

As for anthropometric parameters, a significant increased effect was seen on body protein status (d=0.97, p<0.0001) and body fatness (d= 0.59, p<0.0001) of patients after

Table-1: Characteristics of ESRD Patients.

Characteristics of patients	Frequency/Mean±SD
Patients (n)	100
Age (years)	41.45 ± 17.44
Gender (M/F)	74/26
Primary Cause of ESRD (n)	
Diabetic Nephropathy	56
Hypertensive Sclerosis	17
Glomerulonephritis	15
Acute Kidney Injury	4
Others*	8

*Polycystic kidney disease, reflux nephropathy, renal carcinoma etc.

ESRD: End-stage renal disease

SD: Standard deviation

M/F: Male/Female.

Table-2: Pre and post intervention anthropometric and biochemical parameters of patients (n=100).

Parameters	Pre intervention	Post intervention	P-value	Cohen's d
Post dialysis Weight (kg)	55.57±9.35	55.74±9.64	0.726	0.07
BMI (kg/m ²)	20.35±2.38	20.39±2.35	0.799	0.05
MUAC (cm)	24.14±3.36	25.49±3.58	<0.0001*	0.97
TFF (cm)	0.67±0.35	1.34±2.35	<0.0001*	0.59
Hb (g/dl)	9.12±0.95	10.13±2.24	0.099	0.36
Alb (g/dl)	3.39±0.53	3.47±0.47	0.535	0.13
Chol (mg/dl)	108.71±9.54	117.97±19.76	0.039*	0.46
Na (mmol/l)	132.17±3.09	132.17±3.09	0.467	0.15
K (mmol/l)	5.32±0.86	4.95±0.73	0.160	0.30
Cl (mmol/l)	109.54±4.87	110.50±5.18	0.571	0.12

Hb: Haemoglobin; Alb: Albumin; Chol: Cholesterol; Na: Sodium; K: Potassium; Cl: Chloride.

*Statistically significant (p<0.05).

BMI: Body mass index

MUAC: Mid-upper arm circumference

TFF: Tricep fat fold.

Table-3: Post and pre intervention nutrients and energy intake of patients.

Nutrients/ energy	Pre-intervention	Pre-intervention	P-value	Cohen's d
Total energy (kcal /day)	1453±263.22	1615±290.39	0.010*	0.38
Carbohydrate (g/day)	214.32±62.88	204.62±59.22	0.565	0.12
Protein (g/day)	49.86±17.40	65.15±17.08	0.003*	0.69
Fat (g/day)	48.16±24.65	78.52±34.44	0.002*	0.74

* Significant (p<0.05).

counselling. Among the biochemical parameters, there was significant improvement in serum cholesterol (d=0.46, p=0.039) of the patients. The effects for other parameters were small and non-significant (Table-2).

There was a statistically significant moderate to high effect on increasing intake of energy (d=0.38, p=0.010), protein (d=0.69, p=0.003) and fat (d=0.74, p=0.02), respectively (Table-3).

Discussion

PEW is common in CKD and is associated with adverse outcomes. Dietary interventions and nutritional support thus become very important for a better overall outcome in haemodialysis patients. The main aim of the study was to evaluate the effect of dietary counselling on the nutritional status of ESRD patients undergoing HD. Patients with PEW were identified according to ISRNM criterion and then subjected to dietary counselling to check improvement in selected parameters.

Survival rate of haemodialysis patients can be predicted through their nutritional status as their protein and energy requirements are higher than normal population.^{21,22} However, their average protein-caloric requirement

declines with a decrease in glomerular filtration rate (GFR) from more than 37ml/min/1.73m² to less than 21ml/min/1.73m² resulting in poor nutritional status.^{23,24} A decrease in mortality and morbidity rates of dialysis patients have been found to be associated with increase in BMI, TFF and MUAC, particularly in patients with a BMI of 23 kg/m² or higher.²⁵⁻²⁷ Serum cholesterol and transferrin are also the recommended markers of malnutrition that decline with the progression of CKD.^{12,28,29}

Various studies have revealed positive effect of dietary counselling on the nutritional status of HD patients.³⁰ The present study also demonstrated a significant increase in body fatness, body protein status and serum cholesterol with dietary counselling. The actual intake of energy and nutrients by the study subjects was lower than the recommended value, but was improved significantly after dietary counselling. The results of the dietary habits of the study patients did not match the recommendations. These results recall the attention for individual dietetic counselling in HD patients and also for a critical re-evaluation of their dietary protein and energy requirements. Worsening malnutrition might be the result of low calorie and protein intake. Thus, regular nutritional status assessment becomes important in HD patients for early detection of malnutrition

and timely management of their condition. Therefore, dietary counselling and a close follow-up of CKD patients by dietitians are important in order to improve their energy and macro-nutrients from the diet.

Conclusion

Dietary counselling can have an important role in providing the recommended intake of nutrients and improving the nutritional status of ESRD patients. In order to ensure safety, efficacy and compliance, oral nutritional supplements can be added along with dietary counselling.

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Conflict of Interest: None.

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