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Research Article

DIETARY INTERVENTION AND PROTEIN SUPPLEMENTATION IN CHRONIC KIDNEY DISEASE PATIENTS UNDERGOING HEMODIALYSIS

CHEENAM B[1*], LEENA P[2]

[1]Department of Clinical Nutrition & Dietetics, Fortis Escorts Hospital, Amritsar, Punjab, India. [2]Department of Biotechnology & Biosciences, Lovely Professional University, Phagwara, Punjab, India. Email: cheenam.bhatia89@gmail.com

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ABSTRACT

Objective: The present study was conducted with the aim to assess and analyze the nutritional status of patients (>30yrs) undergoing haemodialysis.

Method: 50 subjects were enrolled in the study (32 males and 18 females). Various biochemical parameters such as Sodium, Potassium, Creatinine, Phosphorus, Albumin etc along with amount of calorie and protein intake were compared pre and post nutritional counseling and protein supplementation for 30 days during ongoing haemodialysis.

Result: Short term implication showed a significant statistical difference in the biochemical parameters. Adequate dietary counseling along with oral nutritional supplementation given during haemodialysis improved the nutritional status of malnourished Chronic Kidney Disease patient. About 81% of the patients showed proficient response whereas the remaining 18% showed a moderate improvement in their nutritional status.

Conclusion: Patients undergoing haemodialysis commonly develop protein-energy malnutrition which is associated with poor survival. Special nutritional care is required for the dialysis patient to improve the net protein anabolism.

Keywords: Hemodialysis, Protein, Chronic kidney disease, Nutritional status, Malnutrition.

INTRODUCTION

The kidneys help filter waste, excess fluid, and toxins from the blood. If kidneys don't work properly, harmful substances build up in the body, wastes such as nitrogen and creatinine accumulate in the bloodstream, blood pressure can rise, and too much fluid can collect in the body's tissues, which leads to swelling called edema [1].

If the kidneys are damaged or fail, then dialysis or a kidney transplant is required to take over their job [2]. In medicine, dialysis is a process for removing waste and excess water from the blood and is used primarily as an artificial replacement for lost kidney function in people with renal failure [3,4].

Patients undergoing hemodialysis (HD) commonly develop protein-energy malnutrition which is associated with poor survival [5,6]. Dialysis removes protein waste accumulated in the blood. Unfortunately, some important amino acids are removed during dialysis and thus a higher protein intake is needed to replace the lost protein. If the protein requirement is not met then, it results in malnutrition in such patients [7].

Malnutrition is an important problem in patients treated with chronic HD. It occurs in 20-70% of patients with an increasing length of time on dialysis correlating with an increasing decline in nutritional parameters [8].

Nutrition in HD is very important in decreasing complications and improving the quality life of patients[9]. Nutrition program on patients with chronic renal failure on dialysis plays an important role in the process of treatment [10]. The purposes of medical nutrition therapy in dialysis patients are to promote the nutrition to correct patients' appetite, to correct systemic complications composed by the loss of nephrons in progress, to reduce of protein catabolism to the lowest level, to relieve or prevent the cardiovascular, cerebrovascular diseases formation, to prevent increasing fluid and electrolyte disorders, to reduce uremic symptoms such as itching, nausea, vomiting, loss of appetite and to ensure optimum nutrition [11,12]. In addition, medical nutrition helps to avoid high potassium and sodium from the diet, to prevent pulmonary edema, hypertension and heart failure, to prevent renal osteodystrophy keeping the consumption of calcium and phosphorus under control, to prevent protein energy malnutrition [13].

Optimal protein and calorie intake in the chronic kidney disease patients undergoing dialysis is estimated to be as much as 1.3 g/kg protein and 35 kcal/kg energy. In contrast the actual intake on average is 0.9 g/kg for protein and <25 kcal/kg for calorie [14,15].

METHODS

A randomized clinical trial was conducted on 50 patients including 32 males and 18 females. The patients undergoing dialysis >30 years of age were selected randomly to analyze their nutritional status. The anthropometric measurements (weight, body mass index [BMI]) and biochemical parameters (sodium, potassium, phosphorus, creatinine, and serum albumin) were measured at initial stage, followed by their re-evaluation at the end of 30 days (Table 1).

The amount of food intake and food preference was analyzed by taking the patient's diet history with the help of 24 hrs recall method. The patient's age, gender, social environment, economic, psychological, and

Table 1: Characteristics of the subject patients

Characteristics of the patients	
Patients (n)	50
Age (years)	30-55 (range)
Sex (M/F)	32/18
Mean dialysis duration (years)	3-6 years
Cause of end-stage renal disease (n)	
Diabetes	18
Glomerulonephritis	8
Unknown	14
ARF	4
Systemic lupus erythematosus	2
Polycystic kidney disease	4

ARF: Acute renal failure

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Table 2: Depicting the macronutrient requirements for the HD patients[16]

Macronutrients and fiber	
DPI	1.2 g/kg/day (at least 50% of high biological value)
DEI	35 Kcal/kg/day
Total fat	25-30% of total energy intake
Carbohydrates	50-55% of total energy intake (especially complex carbohydrates)
Total fiber	20-25 g/day

DPI: Dietary protein intake, DEI: Daily energy intake, HD: Hemodialysis

Table 3: Depicting the micronutrient requirement by the HD patients[16]

Minerals and water (range of intake)	
Sodium	750-2000 mg/day
Potassium	2000-2750 mg/day
Phosphorus	800-1000 mg/day
Calcium	<1000 mg/day
Magnesium	200-300 mg/day
Iron	10-18 mg/day
Water	Usually 750-1500 ml/day

HD: Hemodialysis

Table 4: Depicting the changes in the anthropometric and biochemical parameters of the subjects

Parameters	Male		Female	
	Pre	Post	Pre	Post
Body weight (kg)	61±4.5	63.5±4.5	46.6±3	50.1±3
BMI (kg/m^2)	20.5±1.5	21.9±1.5	19.3±1.5	20.9±1.5
Sodium	141.6±0.5	140.3±0.5	138.2±0.5	137.5±0.5
Potassium	4.8±0.5	4.5±0.5	4.1±0.5	3.9±0.5
Phosphorus	3.6±0.5	3.5±0.5	3.3±0.5	3.4±0.5
Serum albumin (g/L)	2.89±0.2	3.44±0.2	2.94±0.2	3.36±0.2
Creatinine (mg/dl)	11.4±1.5	8.5±1.5	9.1±1.2	6.6±1.2
Cholesterol (mg/dl)	190.8±45	182±45	188±45	179±45
Triglycerides (mg/dl)	144.1±50	135±50	149.4±50	141.6±50

BMI: Body mass index

educational status and history of the disease was noted. Daily intake of calories and nutrients of the patients was calculated with information from those records.

In addition, laboratory values were very important for preparing an appropriate diet for HD patients so as to improve their malnourished condition which ultimately leads to increased rates of morbidity and mortality (Tables 2 and 3).

RESULTS AND DISCUSSIONS

The dietary intake was recorded at the end of the month and then calculated to analyze the changes in the energy (calories) and protein intake.

The various anthropometric and biochemical parameters were also collected and analyzed by comparing the results with the earlier recorded data (Table 4, Figs. 1 and 2).

DISCUSSION

Adequate nutrition is very important for dialysis patients for a better overall outcome. Protein-energy malnutrition is highly prevalent (25-50%) among dialysis patients and is associated with increased morbidity and mortality [17]. Prevention of malnutrition by proper dietary counseling and adequate dietary intake with proper nutritional support is probably the most effective therapeutic approach.

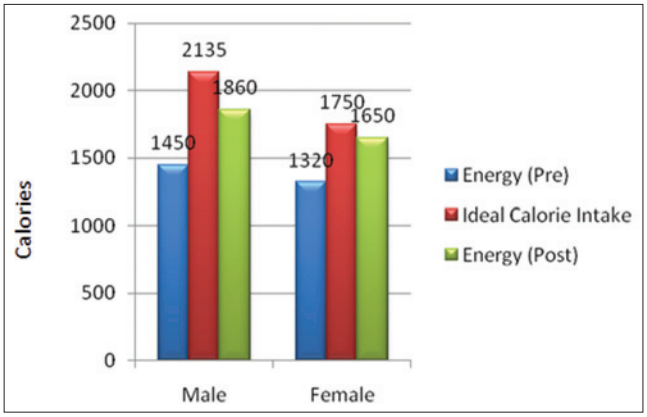

Fig. 1: The increase in the calorie intake and comparison to the ideal requirement

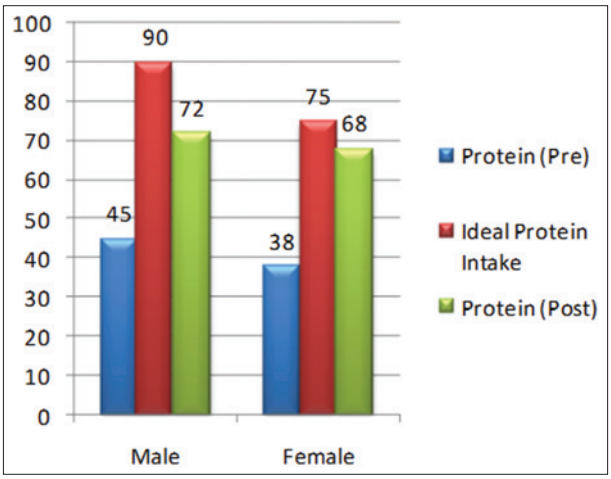

Fig. 2: The increase in the protein intake and comparison to the ideal requirement

CONCLUSION

Regular assessment of nutritional status in HD patients is important and early detection of malnutrition can be helpful in improving this condition [18]. Patients may be predisposed to receiving lower than recommended amounts of energy and macro-nutrients to the diet and patients who received information or counseling about their diet must be followed up closely by the dietitians [13]. The follow-up in the study showed an increase in the intake of calories by 22% in males and 20% in females, along with an increase of 37.5% and 44% of the intake of protein by males and females respectively. Accompanying these changes were the increase in weight, BMI, serum albumin levels in the patient along with the reduction and balancing of other important parameters such as sodium, potassium, creatinine, and phosphorus.

The regular follow-up, counseling, nutritional support helps to improve the calories and protein intake hence improvising the condition of malnutrition amongst the HD patients and helps reduce the rate of morbidity and mortality amongst the patients.

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