NUTRITIONAL ASSESSMENT OF HEMODIALYSIS PATIENTS

MANZOOR, A. SHAHID, S. TARIF, N

i. Abstract

Malnutrition is common in hemodialysis patients and closely related to morbidity and mortality. Therefore, assessment of nutritional status and nutritional management of hemodialysis patients play a central role. This study is carried out in three different dialysis centers of Lahore, to determine the frequency and severity of malnutrition in dialysis patients, to evaluate the dietary approach and dietary compliance of dialysis patients, and to recommend an appropriate dietary modality for dialysis patients. For enlightening the quality of life and for decreasing the complications Medical Nutrition Therapy (MNT) is very important in dialysis patients. This study is based on the nutritional assessment of dialysis patients. It will provide the information about the current nutritional status of dialysis patients whether the patient is well nourished, moderately malnourished or severely malnourished. To assess the biochemical values for sodium, potassium, albumin levels, hemoglobin levels, TIBC levels, iron levels, urea levels and creatinine levels. To assess the diet history, anthropometric measurements, physical examination and life style factors of dialysis patients are also included in this study.

Keywords: Nutritional Status, Nutritional Assessment, Malnutrition, Morbidity and Mortality Rate

ii. INTRODUCTION

The main purpose of dialysis is to remove all waste products like urea, uric acid and creatinine and excess body fluid, due to the dysfunction of kidneys. Dialysis is done by using a special fluid called dialysate. Dialysate, a mixture of pure water and chemicals, is carefully controlled to pull wastes out of the blood without removing elements your body needs (Alshatwi 2007). Malnutrition and poor nutrient reabsorption is common in dialysis patients due to the kidney dysfunction. So the nutritional assessment is an important way to determine daily nutrient intake in dialysis patients. Nutritional assessment and diet in dialysis patients aims to maintain nutritional status and prevent mal-nutrition, to avoid the buildup of metabolic waste products and further complications related to renal disorders. Some further complications with nutrition consequences may include, Hypertension, Growth failure, Muscle Wasting, Raised blood lipids. Edema, Bone diseases, congestive heart failure and Anemia (Gunes 2013).

According to Kopple (1994). **"Malnutrition is mild to moderate in about 33% of dialysis patients and severe in approximately 6% to 8%".** Medical Nutrition Therapy (MNT) is very important in dialysis patients. For enlightening the quality of life and for decreasing the complications, the purpose of medical nutrition therapy in dialysis patients is to promote the nutrition to precise patients' appetite, to correct systemic complications due to the loss of nephrons

in progress, to reduce of protein catabolism to the lowest level, to relieve or prevent the cardiovascular, cerebrovascular, peripheral vascular 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 (Guneş, 2013).

Medical Nutrition Therapy 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 with saving patients' food consumption and detecting nutritional status with methods such anthropometric measurements and laboratory finding. Negative changes (hyperkalemia, hyperfosfotemi, peripheral and pulmonary edema) in fluid electrolyte balance occur in patients who do not fulfil to the diet (Cianciaruso 1995; Kopple 2004; Mahan 2012).

The regular nutritional assessment of dialysis patients is very important and can help in the early detection of malnutrition (Fouque 2003). Because the dialysis patients are at high risk of malnutrition so medical nutrition therapy prevent them from further complications and malnutrition. The evaluation methods used in the nutritional status showed that 18-75% prevalence of malnutrition in hemodialysis patients, malnutrition could cause a worse outcome and subsequent mortality (Dwyer 2005).

iii. MALNUTRITION IN DIALYSIS PATIENTS

Through research or different studies we can demonstrated that there are two types of malnutrition in dialysis patients. The first type indicated by Uremic Syndrome and decrease in serum albumin levels due to insufficient intake of protein and energy. The second type is associated with inflammation and atherosclerosis, high cardiovascular mortality (MIA Syndrome). Protruding features of this type, proinflammatory cytokines, increased oxidative stress, increased protein catabolism, increased resting energy expenditure, hypoalbuminemia (Stenvınkel 2000; Baltzan 1998).

Malnutrition also occur due to overload congestive heart failure, poor nutrient intake, systemic hypertension, uremic bone disease, extra-skeletal metastatic calcification due to hyperphosfotemia, these are the most adverse conditions in dialysis patients as a result of diet inconsistency. There are certain catabolic and inflammatory situations as well as tissue loss with dialysis patients (Gunes 2013).

iv. ENERGY

The energy metabolism is impaired in dialysis patients so according to (Kopple, 2001; Kopple, 2004; Cano, 2006; Fouque, 2003). The daily RDA for dialysis patients is: The total energy intake for dialysis patients per day is 35 Kcal/kg/day for patients <60 years of age and 30-35 Kcal/kg/day is recommended for patients >60 years. Because people with hemodialysis are taking low calorie diet so according to Salmowits et al. (1989) low energy intake in dialysis patients may lead towards the muscle wasting and malnutrition that’s why people with dialysis may become so lean and thin. According to Pollock et al. (2002), almost two third of the patients are malnourished which are on dialysis stage. A longitudinal and cross-section study shows that dialysis patients have taking low calorie low protein diet so the people who are overweight and obese (BMI $\geq$ 25.5) have high survival rate and are less malnourished a compare to those people who are underweight and have

lean body mass index (BMI ≤ 17) (Fleischmann 1999).

v. PROTEINS

Protein requirements for dialysis patients are also high due to protein catabolism in the body. Protein should be consumed as 1.1-1.2 g / kg / day and should be high in the biological value (of animal origin) of 50 % protein in hemodialysis patients. Furthermore, the amount of protein of the patient's diet is determined by bearing in mind the state of hydration familiar body weight, glomerular filtration rate and with the sequence of illness. To determine the capability of protein intake in dialysis patients, a good evaluation parameter is BUN value under 120 mg (Pollock 2002).

vi. CARBOHYDRATES

Adequate amount of carbohydrates are also required for enough energy and to maintain protein reserves in the body and for synthesis of tissues. There are many negative effect of high carbohydrate intake in the body such as, hyperinsulinemia, hyperglycemia, hyperlipidemia and obesity. Decline of glucose metabolism and insulin resistance develops in chronic renal failure. Carbohydrate from the diet should be higher to provide enough energy, to protect the holdup protein to be used for tissue protein synthesis, to cover the energy insufficiency. It should provide 60-65% of daily energy from carbohydrates (Kopple 2004).

vii. LIPIDS

Usually hyperlipidemia and hypertriglyceridemia are present in dialysis patients. Low density lipoproteins (LDL) and very low density lipoproteins (VLDL) are also in high concentration whereas, high density lipoproteins (HDL) and cholesterol are low in concentration in dialysis patients. The main reason of hypertriglyceridemia is the lack of removal of triglycerides from the blood due to the lack or decreased amount of lipoprotein lipase and hepatic lipase enzyme activities. Total fat content of the diet should be between 25-35% of energy and monounsaturated fatty acids 15-20% of total energy, polyunsaturated fatty acids 10% of total energy of the diet (Gunes 2013).

viii. WATER & ELECTROLYTES

Fluid and electrolyte intake should be according to the edema and dehydration. If some conditions such as shortness of breath, swelling of hand feet and eyes, high blood pressure and fluid weight gain are observed fluid consumption should be restricted. Controlling or restriction of sodium and fluid intake are very important in dialysis patients.

In dialysis patients, potassium restriction is often necessary, but the measure of limit depends on residual renal function. Sodium and water intake in patients are adjusted according to the amount of urine, fluid balance and blood pressure (Stark 2011).

A recommended daily amount of fluid of hemodialysis patients should be 500ml + the urinary

output in a day or around 1000-1500 ml. Sodium restriction should be based on the amount of urine. A mild salt restriction as 3-4 g / day is sufficient.

ix. Methodology

It is a cross-sectional descriptive study. The convenience sampling technique is used and after visiting in different hospitals especially in the dialysis wards the hospitals which have largest dialysis unit and are well equipped such as Sheikh Zayed Hospital, Fatima Memorial Hospital and Omer Hospital are selected.

$$\text{Sample Size} = \frac{Z^2_{1-\alpha/2}\ \text{P (1-P)}}{E^2}$$

$Z^2_{1-\alpha/2}$ = Normal Standard Variable

P = Proportion of Nutritional status in Dialysis Patients

α = significance level (5%)

1-α = Confidence Level (95%)

E = Margin of Error (10%)

$$= \frac{(3.8416)\ (0.38)\ (0.62)}{(0.1)^2}$$

$$= \mathbf{90}$$

Frequency and percentage are calculated for qualitative variables. Mean and standard deviation are calculated for quantitative variables. Chi Square is used for comparison/association between nutritional variables.

DATA ANALYSIS

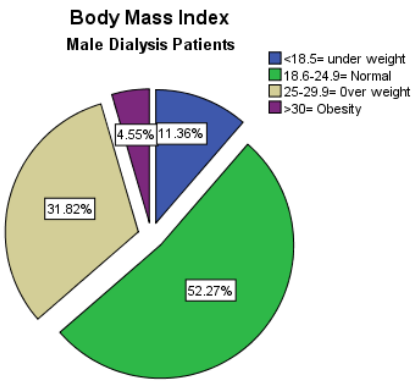


Figure 1 Percentage of NMI of Female Patients

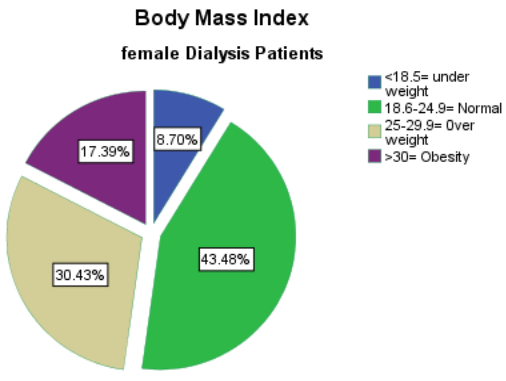


Figure 2 Percentage of BMI of Male Patients

According to this figure 11% Males are those who have BMI less than (18.5) so they are in the category of underweight, 52% males are those who have BMI (18.6-24.9) so they are in the category of Normal and healthy people, 32% males are those who have BMI greater than (25) so they are overweight and 5% males are those who have BMI greater than (29.9) so they are in the category of obesity. Post-dialysis weight is used to calculate body mass index.
According to this figure 9% females are those who have BMI less than 18.5 so they are in the category of underweight, only 44% females are in the category of normal and healthy people, 30% females have BMI greater than 24.9 so they are overweight and 17% females have BMI greater than 29.9 and they are in the category of obesity. These figures are also shows that the females are more prone to obesity and overweight as compare to males because the percentage of obesity is higher in females (17%) rather than in males (5%). Post-dialysis weight is used to calculate body mass index.

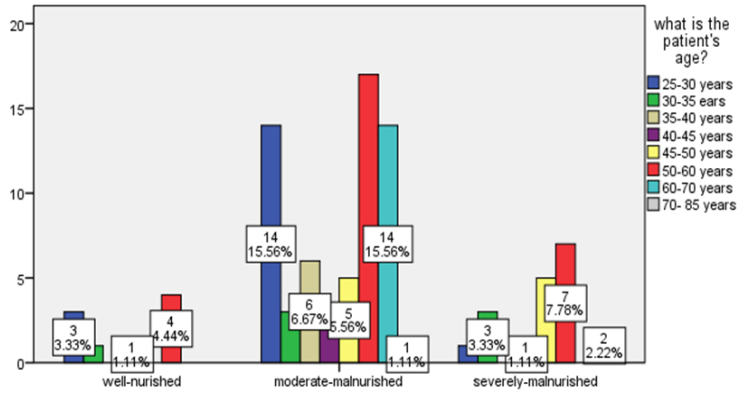


Figure 3 SGA Rating and Age of Dialysis Patients

Figure 3 shows the SGA rating according to the age of dialysis patients. According to this figure, there are 27 dialysis patients which are adults that means they are under the age of 25-35 years. There are 26 dialysis patients which are middle aged that means they are under the age of 35-50 years. Whereas there are 45 dialysis patients are older people that means they are under the age of 50-85 years.

There are total 27 adult patients in which 5 patients are well nourished, 17 patients are moderately malnourished and 5 patients are severely malnourished. There are total 26 middle aged in which only 1 patient is well nourished, 14 are moderately malnourished and 5 patients are severely malnourished. Same as 45 patients are old in which 4 patients are well nourished, 32 patients are moderately malnourished and 9 patients are severely malnourished.

x. Discussions, Conclusion & Recommendations

According to this study, 11% male patients are underweight, 52% male patients are normal (BMI: 18.5-24.9), 32% male patients are overweight and 5% male patients are obese. Same as 9% female patients are under weight, 44% female patients are normal (BMI: 18.5-24.9), 30% female patients are overweight and 17% female patients are obese. Subjective Global Assessment Rating of dialysis patient shows that 9% (7 male and 2 female) patients are well nourished, 62% (29 male and 33 female) patients are moderately malnourished and 19% (8 male and 11 female) patients are severely malnourished. Diet history of dialysis patients shows that 68% patients are taking milk

and milk products 1 time/day, 20% patients are taking 2 times/day, only 1% patient taking 3-4 times milk and milk products / day. 7% patients are those which are taking cereals 2 times/day, 29% patients are taking 3 times/day, 19% patients are those which are taking cereal and group 5 times/day, 4% patients are taking 6 times/day, 6% patients are taking 7 times/day and only 1% patients is taking 8 times/day.

65% patients are taking only 1 serving of fruit group per day, 22% patients are taking 2 servings per day whereas only 3% patients are those which are taking fruits 3 times per day. If we talk about consumption of vegetable group in dialysis patients, 50% patients are taking 1 time/day, 39% patients are taking vegetable 2 times/day and only 1% patients are taking 3 times/day. Daily consumption of meat and meat products are also considered in this study so 9% patients are those which are taking only 1 serving of meat and meat products per day, 43%patients are taking 2 times/day and 32% patients are taking 3 times/day. 50% patients are those which are taking 1 serving of fat and oil group per day and 40% patients are taking 2 serving per day.

There are certain common complications in dialysis patients like hypertension, diabetes, dyspepsia, cardio vascular diseases, edema, muscle weakness and joint paints. 9% well nourished, 62% moderately malnourished and 19% severely malnourished patients are suffering from hypertension, cardio vascular disease, muscle weakness, joint pains, edema, liver disease, gastrointestinal problems and diabetes mellitus. 6% well nourished, 32% moderately malnourished and 12% severely malnourished patients are suffering from dyspepsia.
Life style factors are also considered in this research so 3% well nourished, 51% moderately malnourished and 16% severely malnourished patients are not doing any exercise on regular basis so they are physically inactive. Whereas so 6% well nourished, 11% moderately malnourished and 3% severely malnourished patients are doing exercise on regular basis like walk so they are physically active.
The biochemical findings are also considered in this study so 5% well nourished, 30% moderately malnourished and 11% severely malnourished patients have normal phosphate levels. Whereas 4% well nourished, 32% moderately malnourished and 8% severely malnourished patients have high phosphate levels. 3% well nourished, 23% moderately malnourished and 3% severely malnourished patients have low levels of TIBC's (total iron binding capacity). Whereas 5% well nourished, 37% moderately malnourished and 16% severely malnourished patients have normal levels and 1% well nourished, 2% moderately malnourished have high levels of TIBC's. Calcium is good for bone growth and development but 7% well nourished, 56% moderately malnourished and 19% severely malnourished patients have low levels of calcium. Whereas 2% well nourished, 6% moderately malnourished have normal levels of calcium in their body. 4% well nourished, 36% moderately malnourished and 10% severely malnourished patients have normal levels. Whereas 5% well nourished, 26% moderately malnourished and 9% severely malnourished patients have high potassium levels in their body. Electrolyte balance in the body is maintain by the kidneys so 2% well nourished, 37% moderately malnourished and 12% severely malnourished patients have low sodium levels. Whereas 7% well nourished, 24% moderately malnourished and 7% severely malnourished patients have normal levels of sodium in their body and only 1% patient has high levels of sodium. Urea is a metabolic by product and toxic for body so according to this study 9% well nourished, 62% moderately malnourished and 19% severely malnourished patients have high levels of urea in their bodies. 2% moderately malnourished patients have high levels of serum albumin and 1% well nourished, 10% moderately malnourished and 1% severely

malnourished patients have low levels of serum albumin.
In 44% patients, hypertension is the main cause which lead towards the dialysis. In 15% patients, diabetes is the main cause that leads towards the dialysis, in 24% patients, hypertension and diabetes both are main cause of dialysis and rest of 16% patients have other reasons such as excessive blood loss during surgery and medication reaction. 50% patients have constipation problem. According to this study, 38% patients are those which are taking bakery items 1 time in a week, 20% patients are taking these products 2 times in a week, 4% patients are taking 3 times in a week, 31% patients are those which are taking 4 times in a week and only 2% patients are those which are taking such products 5 times in a week. According to this study, 25% patients are also taking fast foods 1-2 times in a week. This research shows that 30% patients are taking fried foods 1 time in a week and 58% patients are taking fried foods 2-3 times in a week. According to this study, 28% patients are adult, 46% patients are middle aged and 45% patients are older adults or older aged. In 28% adult patients, 5% patients are well nourished, 17% are moderately malnourished and 5% patients are severely malnourished. Whereas in middle aged patients, 1% patients is well nourished, 14% patients are moderately malnourished and 5% patients are severely malnourished. Same as in 45% older people, 4% patients are well nourished, 32% patients are moderately malnourished and 9% patients are severely malnourished.

xi. Conclusion

This study is based on the nutritional assessment of dialysis patients thus it shows that how many patients are well nourished, moderately malnourished and severely malnourished. For enlightening the quality of life and for decreasing the complications, the medical nutrition therapy MNT is very important. The regular nutritional assessment of dialysis patients is very important and can help in the early detection of malnutrition. Because the dialysis patients are at high risk of malnutrition so medical nutrition therapy prevent them from further complications and malnutrition. According to this study, women are at high risk of malnutrition and have more complications than males. There are four main things all dialysis patients need to be careful about in their diet such as Sodium, Potassium, Phosphorus and Fluids. Most of the patients on dialyses failed to maintain the required dietary energy and protein intake. Anthropometric measurements (body mass index, skin fold thickness, estimated percent of body fat, and mid-arm muscle area, circumference, or diameter) are clinically useful indicators of protein energy nutritional status in our maintenance dialysis patient.

xii. Recommendations

To improve the nutritional status and to identify the risk of malnutrition of dialysis patients, regular nutritional checkup is needed.
Every dialysis patient needs an intensive nutritional counseling based on an individualized plan of care developed before the start of dialysis therapy.
Education and dietary counseling should be the first step in attempting to maintain adequate energy and protein intake.
Monitor successive body weight and body mass index aiming to maintain high normal body mass index.
Avoid foods which are rich in phosphorus, sodium, potassium and fluid.
Foods are rich in saturated fats should be avoided to prevent cardio vascular diseases.

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