The Prevalence of Malnutrition in Patients having Chronic Kidney Disease at A Tertiary Care Center in Karachi Pakistan

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ABSTRACT

Background: Chronic kidney disease and associated malnutrition is major health problem in developing countries like Pakistan. CKD patient have been related with body wasting and malnutrition. In this study we assess the prevalence of Malnutrition in chronic kidney disease patients. **Objective:** To determine the prevalence of malnutrition in patients with chronic kidney disease. **Study Design:** The type of study is a cross-sectional study. **Settings:** Dialysis and kidney care center in Karachi-Pakistan. **Duration:** 6 months from December 2017 to May 2018. **Methodology:** Patients with chronic kidney disease (CKD) were included and patients with severe comorbid conditions were excluded from the study. Diagnosis of CKD was made via detailed history and clinical examination and relevant laboratory investigations. Patients were classified into 3 SGA grades. Data was collected in a pre-designed proforma. **Results:** 150 patients were included in the study. The mean age of patients was 58.4 ± 5.86 years. There were n= 93 (62%) males and n= 57 (38%) females. The frequency of malnutrition was n= 63 (42%) were moderately malnourished and n= 32 (21.33%) were severely malnourished. None of the patients under the age of 50 years showed signs of malnutrition. The most common etiology for CKD was diabetes mellitus in n= 75 (50%). The mean BMI of 27.6 ± 5.1 kg/m2, Triceps skin fold thickness was 18.2 ± 7.1 mm and a mean mid upper arm circumference of 23.2 ± 3.9 mm2 respectively. Chi-square test shows a significant association between the incidence of malnutrition and undialysed patients suffering from chronic kidney disease. Having a p-value of <0.001. **Conclusion:** The frequency of malnutrition in undialyzed patients with CKD was very high, mild to moderate malnutrition was more prevalent than severe malnutrition.

Keywords: Caloric deficit, Chronic kidney disease, Malnutrition, Prealbumin, Protein-energy.

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INTRODUCTION

One of the common health-related problems in developing countries of South Asia is malnutrition and chronic kidney disease (CKD). Chronic kidney disease has been steadily increasing in its prevalence across the globe, and chronic renal failure, whether it is compensated or decompensated on hemodialysis is associated with body wasting and malnutrition. The malnutrition experienced by these patients results in loss of weight with a deficiency of fat and important body proteins like prealbumin, albumin and transferrin respectively. Studies have reported that of the patients with chronic kidney disease undergoing hemodialysis 16% to 70% of these patients suffer from malnutrition.[1-4] Various factors such as age, comorbid conditions like diabetes, diabetic nephropathy, hypertension and chronic heart failure may exacerbate the weight loss.[5,6] Other factors include anorexia, infections, anemia and osteodystrophy, among others.[7] The range of malnutrition experienced by CKD patients have been reported to be from 37% to 84% with an Indian study reporting an incidence of 65%.[8] For clinicians it is an important factor as it is a recognized predictor of morbidity and mortality in these patients and is an easily modifiable factor.[9] The main sources of malnutrition in these patients are the abnormal catabolism of protein albumin, loss of blood proteins in hemodialysis and proteinuria experienced by these patients.[10] The loss of protein is manifested as hypoproteinemia and reduced muscle mass.[11] To assess this malnutrition clinicians have used various parameters such as anthropometric measures, strength tests, clinical and biochemical indices like prealbumin, serum albumin, blood cholesterol levels, transferrin and radiographic modalities such as Dual X-ray Energy Absorptiometry (DEXA).[1,8] However, the gold standard is the assessment of total body nitrogen levels.[11-13] Clinicians have used serum albumin levels to predict malnutrition in CKD patients and it also helps in predicting morbidity and mortality of these patients.[13] It is also an independent predictor of the incidence of cardiovascular complication in these patients.[14] Having pre-dialysis serum albumin of less than 2.9 g/dl increases the risk of left ventricular hypertrophy.[15] Similarly, having a BMI of less than 20kg/m^2 have been shown to be a predictor of mortality as well.[16,17] The subjective global assessment (SGA) score is based on features from the patient's history and physical examination.[18,19] There is a shortage of local data on the prevalence of malnutrition in CKD patients in Karachi, Pakistan. Zahra k et.al. reported 97% malnutrition in dialysis-dependent patients.[14] Hence our study aims to determine the prevalence of malnutrition in patients with chronic kidney disease, especially in the pre-dialysis phase.

METHODOLOGY

Study Design: The type of study is a cross-sectional study.
Settings: Dialysis and kidney care center in Karachi Pakistan.
Duration: A period of 6 months from December 2017 to May 2018.
Sample Technique: Non probability convenience sampling
Sample Size: 150 patients
Inclusion Criteria: The inclusion criteria were patients older than 18 years of age, suffering from chronic kidney disease.
Exclusion Criteria: we excluded the patients with comorbid conditions such as gastrointestinal disease, nephrotic syndrome, active neoplasia, tuberculosis, septic shock, dementia and patients who are currently using corticosteroids and other immunosuppressive agents.
Data Collection Procedure: All the patients signed informed consent for participation, and the study was approved by the hospital's ethics committee. Diagnosis of chronic kidney disease was made via detailed history and clinical examination and relevant laboratory investigations. Glomerular filtration rate (GFR) was calculated using Cock Craft Gault formula which is calculated as [(140 - age) × (weight in kilograms)/72 × serum creatinine] for males. To calculate the GFR for females we multiple the results of the formula with 0.85 respectively. SGA scoring was used to measure the nutritional status of the patient. Body mass index was also noted for each of the participants. A BMI of less than 20 kg/m2 was considered as malnourished. Among the anthropometric measures, triceps skin fold of less than 6mm for males and less than 8mm for females was considered as malnourished, and a mid-arm circumference of less than 20m in males and less than 18.5cm in females was considered as being malnourished. Patients were classified into 3 SGA grades. Grade A was taken as well-nourished having a score of 1-10, Grade B was taken as moderately malnourished having a score of 11-25 and finally grade C was taken as severely malnourished having an SGA score of 25-35 respectively. All the data was collected in a pre-designed proforma. The data were analyzed with IBM SPSS version 20. Continuous variables were measured as mean and standard deviations such as anthropometric measures, while categorical variables were analyzed as frequencies and percentages. Data was analyzed using SPSS version 21.0 for windows.

RESULTS

After excluding the participants who did not adhere to our inclusion criterion a total of n= 150 patients were included in the study. The mean and standard deviation for the age of patients was 58.4 ± 5.86 years. There were 93 (62%) males and 57 (38%) females. There were 93 (62%) males and 57 (38%) females. The frequency of malnutrition was n= 63 (42%) were moderately malnourished and 32 (21.33%) were severely malnourished. None of the patients under the age of 50 years showed signs of malnutrition. The frequency of patients being adequately nourished, moderately malnourished and severely malnourished for the age groups is as follows. 5 (10%) in those between 45 and 50 years of age were adequately nourished while no one in that group had malnourishment, 14 (9.38%) were adequately nourished, 3 (2%) were moderately malnourished and 6 (4%) were severely malnourished, for those between the ages of 56 and 60 years of age 12 (8%) were adequately nourished 47 (31.33%) were moderately malnourished and 4 (4%) were severely malnourished, for patients between the ages of 61 to 65 years 8 (5.33%) were adequately nourished, 13 (8.66%) were severely malnourished while no one in this age group was moderately malnourished. In the patients who were between 65 to 70 years of age no one was adequately nourished, 13 (8.66%) were moderately malnourished and 3, (2%) were severely malnourished, while in patients above 70 years of age 1 patient was found to be adequately nourished and 6 (4%) were found to be severely malnourished. When it comes to gender-wide distribution of the males in a total of 93 males, 44 (47.31%) patients were adequately nourished, 42 (45.16%) were moderately malnourished and 7 (7.52%) were severely malnourished, while of the female population total of 57, 10 (17.54%) were adequately nourished, 20 (35.08%) were moderately malnourished and 27 (47.36%) were severely malnourished. The most common etiology for CKD was diabetes mellitus in 75 (50%), other etiologies and demographic variables are given in table 1.

Table 1: Demographic and other variables of the study population suffering from CKD

Variable		Frequency	Percentage
Age in years	Between 12 and 25	4	2.66%
	Between 26 and 35	12	8%
	Between 36 and 45	45	30%
	Between 46 and 55	32	21.33%
	Between 56 and 65	30	20%
	Between 66 and 75	20	13.33%
	Above 75	7	4.66%
Gender	Male	93	62%
	Female	57	38%
Stage of illness	Stage 3	84	56%
	Stage 4	66	44%
	Stage 5	0	0
Body Mass Index (BMI)	<18.5 gm/m2	41	27.33%
	Between 18.5 and 20 kg/m2	36	24%
	>20 kg/m2	71	47.33%
		Means	Standard deviation
	Duration of disease	5.26	1.04
	Glomerular filtration rate	40.2 ml/min/l 1.73 m2	16.9 ml/min/l 1.73 m2
Etiology of Illness			
Diabetes Mellitus (DM)	DM Type I	4	2.66%
	DM Type II	71	47.33%
	Glomerular disease	21	14%

ACEI= Angiotensin Converting Enzyme Inhibitors, ARB= Angiotensin Receptor Blockers

The mean BMI of 27.6 ± 5.1 kg/m2, Triceps skin fold thickness was 18.2 ± 7.1 mm and a mean mid upper arm circumference of 23.2 ± 3.9 mm2 respectively, the laboratory values and anthropometric measures are given in table 2. Chi-square test shows a significant association between the incidence of malnutrition and undialysed patients suffering from chronic kidney disease. Having a p-value of <0.001.

Table 2: Laboratory values & anthropometric variables for patients included in the study population

Variable	Males n= 93	Females n= 57	Total	P value
Laboratory Values				
Triglycerides (md/dL)	139 ± 59	140 ± 71	140 ± 64	NS
High Density Lipoproteins (mg/dL)	46 ± 12	54 ± 15	49 ± 14	<0.001
Low Density Lipoproteins (md/dL)	107 ± 35	116 ± 33	111 ± 33	NS
Cholesterol (mg/dL)	170 ± 46	183 ± 44	176 ± 45	<0.05
Total lymphocyte count (lymphocytes/cc)	1750 ± 565	1670 ± 490	1713 ± 568	NS
C-reactive Protein (mg/L)	4.4 ± 6.0	4.4 ± 6.1	4.3 ± 6.1	NS
Phosphorus (mg/dl)	4.1 ± 1.0	4.2 ± 0.9	4.1 ± 0.9	NS
Potassium (mEq/L)	4.8 ± 0.6	4.8 ± 0.7	4.8 ± 0.6	NS
Proteinuria (g/24h)	1.9 ± 2.2	1.6 ± 2.7	1.8 ± 2.5	<0.05
Diuresis (L/day)	2.4 ± 0.6	2.1 ± 0.6	2.3 ± 0.7	<0.001
Urea (mg/dL)	139 ± 44	136 ± 43	138 ± 44	NS
Creatine Clearance (ml/min)	18 ± 4.0	17 ± 4.0	17 ± 4.0	NS
Creatinine (mg/dl)	3.8 ± 1.2	3.6 ± 0.9	3.7 ± 1.0	NS
Albumin (g/dl)	3.6 ± 0.4	3.6 ± 0.5	3.5 ±	NS
Anthropometric Variables				
Weight in kilograms	75.5 ± 13.2	65.1 ± 14.5	72.4 ± 15.3	<0.001

NS= Not Significant

DISCUSSION

According to the results of our study, there is a high prevalence of malnutrition in patients who suffer from CKD and are undialyzed. The stages three to five of CKD account for the greatest number of cases of malnutrition, even though malnutrition is an accurate predictor of morbidity, it is not a cause of death in these patients. Studies have concluded that there is an association between malnutrition and atherosclerosis.[20] The mean age of our study participants was 58.4 ± 5.86 years which is similar to studies done in Morocco by Moncef et al., who in there study describes a mean age of 52 ± 12 years.[20] Srinivasan et al. had a mean of patients of 71 ± 10.7 years in their study conducted in the United States of America and Detsky et al. had a mean age of 52.7 ± 17.7 years in their study conducted in Canada.[17,19] he ratio of male to female patients in our study was 2:1, which is well correlated with studies conducted in other parts of the globe such as Switzerland, Thailand and Ohio.[21] The duration of disease in our study was between 4 to 7 years, in a study by Leavy et al. the mean duration of illness was found to be 5.27 ± 1.05 years. 57.3% of the patients were being seen by a nephrologist for great then1 year, 31.4% were under the care for less than six months, and 14.1% were in care for less than one month.[22] In our study, we used the body mass index as a tool to determine malnutrition. The mean body mass index was found to be 45.65 ± 1.94 kg/m^2. In patients undergoing dialysis, a higher BMI is associated with an improvement in prognosis. Moncefet al. in their study had a mean BMI of 23 ± 4 kg/m^2 and divided the patients into two groups dependent on their BMI. The first group had n= 26, 71% of patients who were adequately nourished and n=11, 29% of patients were malnourished.[16] In our study, 27.33% of patients were malnourished according to a BMI of less than 18 kg/m^2. This value is higher in comparison to other studies.[21-28] The SGA tool is well recognized and well researched. It is the only tool recommended by the AS-PEN board of directors, and a patient generated SGA is used widely in clinics.[24] Malnourishment in our study was highest in patients between the ages of 56 to 60 years for moderate levels of malnourishment, and severely malnourished patients were highest in the age range of 61 to 65 years. In patients suffering from progressive chronic kidney disease, their protein intake should not be less than 0.75 g/kg of body weight per day, and at least 50% of that protein should come from high-quality sources. A person suffering from CKD should have a caloric intake of 35Kcal/kg/day to decrease the incidence of protein energy malnutrition considering the low protein diet. Patients who undergo peritoneal dialysis are at an increased risk of severe malnutrition. Malnutrition is most common at the beginning of dialysis due to generalized lethargy, anorexia, metabolic acidosis and disruption in the mood of the patient. The defect in caloric intake leads to the body using protein and fat stores for energy, which leads to a decrease in weight and muscle mass. This situation is dangerous as the production of toxins can lead to a high mortality rate in these patients as their renal function is already compromised.[22,23] When it comes to the anthropometric variables, we had a mean BMI of 27.6 ± 5.1 kg/m^2, Triceps skin fold thickness was 18.2 ± 7.1 mm and a mean mid upper arm circumference of 23.2 ± 3.9 mm^2, which is similar to other similar studies.[20]

In the modification in the diet in renal disease (MDRD) studies, the benefits of a low protein diet were assessed in patients with CKD. The patients in the study were kept on a normal protein diet with an intake of 1.3 g/kg/day, a low protein diet with an intake of 0.58 g/kg/day or a very low protein diet with an intake of 0.3 g/kg/day which is supplemented with a special mixture of

ketoacids and amino acids at 0.28 g/kg/day, as per the patients GFR status. After following the patients for a little over two years, consuming a low protein diet was not found to be associated with increased rates of mortality, hospitalization or malnutrition. However, low protein in taking was associated with lower caloric intake, decrease in serum transferrin, percentage of body fat and upper arm circumference. In is also worth noting that protein restriction would result in certain nutrition deficiencies such as vitamins and energy deficiencies. It is noted in studies that the requirements of patients suffering from CKD are not different than the normal population.[21,22,23] Out study had certain limitations; firstly, it was conducted a single center in a large urban population. The urban population overall is much healthy and has good nutritional status. Hence the results of the study cannot be generalized to the rural populations. Secondly, our sample size was quite small, and it is possible that due to the small sample size, we missed out a variety of factors that might lead to the incidence of malnutrition and went unreported. With that said, we believe our study is a monumental step and would help advance the understanding of malnutrition in CKD patients in Pakistan and globally.

CONCLUSION

In our cross-sectional study we found that the frequency of malnutrition in undialyzed patients suffering from chronic kidney disease was very high in our study population, secondly mild to moderate malnutrition was more prevalent than severe malnutrition. Physicians should focus on improving the nutrition status of patients with CKD to avoid the patients getting severely malnourished.

LIMITATIONS

A single centre study with a cross sectional design.

SUGGESTIONS / RECOMMENDATIONS

A lager multi centric study with a large sample size.

CONFLICT OF INTEREST / DISCLOSURE

No conflict of interest is involved.

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