ORIGINAL ARTICLE

MALNUTRITION IN CHRONIC KIDNEY DISEASE PATIENTS- A STUDY AT A TERTIARY CARE HOSPITAL

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ABSTRACT

Objective: To determine the frequency of malnutrition in patients with chronic kidney disease (CKD)

Materials and Methods: This cross-sectional descriptive study was conducted at the Department of Nephrology, Lady Reading Hospital, Peshawar from 15-06-2020 to 15-12-2020. CKD patients aged 20 to 80 years (mean age 53.55+ 8.078) were enrolled and assessed for malnutrition using Mini Nutritional Assessment (MNA) Score. Patients with MNA® of 0 to 7 were labeled as malnourished. Data were analyzed using SPSS version 23.

Results: A total of 170 CKD patients were enrolled. Among them, 118 patients were male and 58 females. The male to female ratio was 2:1. Malnutrition was observed in 65 patients (38.2%). Malnutrition was significantly associated with age of the patient ($p = 0.05$) and duration of CKD ($p = <0.001$).

Conclusion: Malnutrition was found in 38% of patients with CKD on hemodialysis. Patients with prolonged illness and advanced age are more likely to suffer from this condition.

Key Words: Chronic kidney disease (CKD), Malnutrition, Hemodialysis.

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INTRODUCTION

The Kidney Disease Quality Outcome Initiative has defined chronic kidney disease (CKD) as kidney damage or glomerular filtration rate (GFR) <60 mL/min/1.73 m2 for 3 months or more, irrespective of the cause. [1] It is one of the major public health concerns with an overall prevalence of 13.4% and the number of patients with kidney disease requiring replacement therapy is estimated between 4.9 to 7.0 million. [2]

Our country is no exception to this considerably high prevalence of CKD. Reports of a population-based cross-sectional study conducted in our country showed that the crude prevalence of chronic kidney disease is approximately 5.3% with diabetes and hypertension being the leading underlying etiology. [3] The clinical profile of CKD-related complications is very wide-ranging from cardiovascular complications to endocrine, gastrointestinal, and metabolic disorders. Malnutrition is one of the known complications of CKD. [4] Malnutrition is defined as an imbalance between nutrient requirement and intake resulting in cumulative deficits of energy, protein, or micronutrients that may negatively affect growth, development, and other relevant outcomes. [5] The approximate prevalence of malnutrition in CKD patients is about 31%. [6] The underlying mechanism for malnutrition in CKD patients is the cumulative effect of several derangements ranging from decreased oral intake due to uremia, the edematous small intestine lining creating hindrance to the absorption of nutrients, increased loss of nutrients e.g., proteinuria, hormonal and enzymatic disturbances leading to an imbalance in the metabolism of various macro and micronutrients. [7] A study by Ahmed K et al., reported a 42% prevalence of malnutrition in chronic kidney disease. [8] In a comparative descriptive study of nutritional assessment in CKD patients versus non-CKD patients, with blood hemoglobin level as a predictor of nutritional status, it was reported that low hemoglobin level was more prevalent in CKD patients compared to non-CKD. [9]

Malnutrition is a frequent finding in patients with chronic kidney disease on maintenance hemodialysis. The pathophysiology is complex and multifactorial. Suppression of digestive hormones stimulating the appetite is shown to play a key role in the development of malnutrition in patients with chronic kidney disease through loss or reduction of appetite. Similarly, reduction in sensitivity to insulin and subsequent dysregulation of glucose is also shown to be pivotal. [10] Other mechanisms include alteration in the normal gut flora in uremic patients, high circulating of inflammatory cytokines leading to hypoproteinemia due to chronic inflammatory state. Chronic in-

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flammation further suppresses appetite. Cumulative effect poses the patient to malnutrition. [11]

Comprehensive studies on the assessment of nutritional status in chronic kidney disease in our local population are lacking. So, this study is aimed to assess the nutritional status of chronic kidney disease patients presenting to the Nephrology Unit of Lady Reading Hospital, Peshawar. the results of the study will emphasize the importance of correcting the nutritional status of patients with CKD.

MATERIAL AND METHODS

This Cross-sectional was conducted at the Department of Nephrology, Lady Reading Hospital Peshawar with the permission of the ethical review committee of the hospital from 15-06-2020 to 15-12-2020. Patients were recruited through a convenient sampling method. Both male and female patients with chronic kidney disease with the age range of 20 to 80 years were included. Both pre-dialysis and patients undergoing dialysis were included.

Chronic kidney disease was confirmed based on KDIGO criteria that included 1) routine examination of urine sample positive for markers of kidney damage e.g. albuminuria. 2) eGFR less than 60mL/min/1.73m2), imaging studies supporting chronic kidney disease e.g. ultrasound study showing cortical thickness less 6 mm, renal length less than 8 cm, irregular margins, and increased renal cortical echogenicity. The persistent presence of any two for more than 3 months was considered confirmatory for chronic kidney disease. Patients with a history of hypothyroidism, malabsorption disorders, chronic liver disease, malignancy, and chronic infective conditions like tuberculosis were excluded.

Patients with chronic kidney disease were enrolled from the indoor department of Nephrology, Lady Reading Hospital, Peshawar. Demographics including age, gender, height, weight, and BMI were noted. Information regarding etiology, duration of CKD, and dialysis (pre-dialysis/post-dialysis) were recorded. Nutritional status was assessed using MNA proforma consisting of six components including appetite change, unintentional weight loss, mobility, psychological issue, neuropsychological disorder, and BMI. Score 0 to 7 was labeled as malnourished. Blood metabolic profile was determined in the blood samples of patients in the hospital laboratory for serum calcium and serum albumin. Serum calcium less than 8.6 mg/dl and serum albumin less than 3.5 gm/dl were considered positive for malnutrition. Data were analyzed using SPSS version 23. Means (with standard deviations) were calculated for quantitative variables including age, duration of CKD, height, weight, BMI, serum calcium, and serum albumin. Qualitative variables including gender, etiology of CKD, dialysis status, and malnutrition were presented in frequencies and percentages. Statistical tests of significance included the student t-test for continuous variables and the chi-square test was used for categorical variables. Chi-square of independence with Cramer V nominal was applied for the association of malnutrition with age groups, gender, BMI status, dialysis status, and etiology of CKD. p-value ≤ 0.05 was considered statistically significant.

RESULTS

A total of 170 patients fulfilling the inclusion criteria were studied. The age of the patients ranged from 20 to 80 years. The mean age was 53.55(±8.078 SD) years. One-hundred and fifty-three patients (90%) belonged to the age group 41-60 years. Out of 170 patients, 118 patients (69.4%) were males and 52 patients (30.6%) were females. The male to female ratio was approximately 2:1. The mean BMI of the patients was 24.8 (±2.67 SD) Kg/m^2. The majority of the participants (102 patients) had BMI in the range of 19.1- 25.0 Kg/m^2. Diabetes mellitus was the most common underlying etiology of CKD. It was observed in 114 patients (67.1%) followed by hypertension (see table-1). CKD duration was grouped into patients having CKD duration less than one year and patients having CKD duration of more than one year. 110 patients (64.7%) had a CKD duration of more than 1 year.

According to MNA Score, malnutrition was observed in 65 patients (38.2%). Mean serum calcium and mean serum albumin in patients with positive malnutrition were 8.17 (±1.951SD) mg/dl and 3.2 (±0.99 SD) gm/dl.

DISCUSSION

In our study, malnutrition was observed in 38.2% of patients with chronic kidney disease. Results of the study conducted by Ahmed KA and colleagues are higher as compared to the results of our study who reported malnutrition in 63.3% of patients with chronic kidney disease. [8] This disparity could be attributed to more number of male participants in our study. In general, nutritional status in our country isn't satisfactory but females are more prone to undernutrition compared to men. [12] Though this study could not establish a significant association between gender and malnutrition (p-value = 0.468), the proportion of females with malnutrition was higher compared to male patients (42.3% vs. 36.4%). The mean age of the patients was 53.55 (±8.078SD) years. Results of our study are comparable to the reports of a Moroccan study where the reported mean age was 52±12 years. [13] However, a much higher mean age has been reported in such patients in a study conducted in the western population. [14] A significant association was observed between malnutrition and age (p-value = 0.05). A rising trend was observed in the proportion of malnutrition with advancing age. This effect could be explained by the cumulative effect of degenerative changes with rising age and dysmetabolism in uremic patients.

Table 1: Patient baseline characteristics and association with malnutrition

		Malnutrition		p-Value
		Yes	No	
Age	20-40	3(100.0%)	0(0.0%)	0.050
	41-60	55(35.9%)	98(64.1%)	
	61-80	7(50.0%)	7(50.0%)	
Gender	Male	43(36.4%)	75(63.6%)	0.468
	Female	22(42.3%)	30(57.7%)	
BMI (kg/m2)	19.1-25.0	39(38.2%)		0.388
	25.1-30.0	25(41.0%)	36(59.0%)	
	30.1-35.0	1(14.3%)	6(85.7%)	
Etiology of CKD	DM	38(33.3%)	76(66.7%)	0.285
	Hypertension	12(46.2%)	14(53.8%)	
	Glomerulonephritis	4(66.7%)	2(33.3%)	
	Interstitial Nephritis	2(33.3%)	4(66.7%)	
	Misc. Causes	9(50.0%)	9(50.0%)	
Dialysis Status	Pre-Dialysis	35 (37.6%)	58(62.4%)	0.859
	Post Dialysis	30(39.0%)	47(61.0%)	
CKD Duration	Less than 1 year	7(11.7%)	53(88.3%)	<0.001
	More than 1 year	58(52.7%)	52(47.3%)	

A significant association was observed between the duration of chronic kidney disease and malnutrition in our study. The effect could be explained by the prolonged exposure of CKD patients to continuous oxidative and inflammatory stress combined with dysregulation of gut bio-flora and hormonal imbalance. [15] On the other hand, Adejumo et al., failed to report a significant effect of prolonged illness on malnutrition in the absence of function of kidneys.[7] Diabetes mellitus was the most common cause of chronic kidney disease in the study participants (67% patients), followed by hypertension (15.3% patients). This study could not establish a significant effect of the etiology of CKD on malnutrition. Similarly, no significant association was observed between BMI and malnutrition. This result disagrees with the report of the study conducted by Srinivasan et al., who reported a significant association between malnutrition and BMI with malnutrition being more prevalent in underweight patients. [14] It may be due to the effect of extracellular and third space fluid collection on the weight of study participants. To control this bias, the lower limit of healthy BMI range was raised to 19 kg/m2 in this study compared to the routine 18.5 kg/m^2. Had this bias been controlled by dry and wet weight, the results might have been different.

This study has some limitations. Of most importance is a single-center study with a limited number of patients to find the true relationship of the prevalence of malnutrition in CKD and its association with other variables like duration of disease, cause of CKD, and other factors. Large-scale multicenter studies are needed to address these and other issues.

CONCLUSION

Malnutrition was found in 38% of patients with CKD on hemodialysis. Patients with prolonged illness and advanced age are more likely to suffer from this condition.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

Muhammad S: Idea and writing of the manuscript.

Ikram M: Data collection

Roghani Z: Data and Statistical Analysis

Khursheed M: Overall supervision of the study during collection of data and compiling, corrections and re writing

Ghulam S: Collection of data and compiling, corrections and re writing

Hanif M: Bibliography

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.