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Malnutrition among Chronic Kidney Disease Patient Undergoing Dialysis at a Tertiary Care Hospital - A Cross Sectional Study

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Abstract

Chronic kidney disease (CKD) is caused by an array of different diseases and it is characterized by progressive reduction of renal function. Increase in the prevalence of diabetes and hypertension contribute to the increased prevalence of CKD in the world. Nutrition status has a role in the quality of life of patients with CKD. A cross sectional study was undertaken in the renal unit of department of medicine at a tertiary care hospital. We used various anthropometric and biochemical measurement to assess the nutritional status of patient with chronic kidney disease. A total of114 patients with CKD were admitted to the ward and of then 53 fulfilled our inclusion criteria and finally 35 were enrolled in the present study. Of the total 35 patients 16 were female and 19 male patients. The proportion of patients with different co-morbid conditions was Diabetes (40.0%), Hypertension(57.1%), anemia(88.8%), and albuminuria(40.0%). Overall 11 patient didn't had any degree of malnutrition, 19 participants had mild to moderate degree of malnutrition and 5 had severe malnutrition.It was concluded that considerable proportion of patient with chronic kidney disease undergoing dialysis were malnourished.

Key Words: Chronic Kidney Disease, Malnutrition,Diabetes

Introduction

Chronic kidney disease (CKD), characterized by progressive reduction of renal function, is a growing problem all-round the world. The total number of CKD patients has markedly increased during the last few decades[1,2] and the prevalence of CKD has reached critical level in some Asian countries such as Korea, Taiwan, Iran, Japan, China, and India. This number will undoubtedly increase in coming years as the proportion of geriatric age group is increasing continuously in these nations[3]. Furthermore, increase in the prevalence of diabetes and hypertension and the wider availability of therapy such as dialysis and kidney transplantation, contribute to the increasing prevalence of patients with CKD[4.] The kidneys are essential for maintaining many aspects of homeostasis. The main functions of the kidneys include elimination of waste products, regulation of water, electrolyte and acid-base balance, and the synthesis and regulation of hormones. In addition, the kidney is one of the principal organs involved in nutritional balance in the body. The human kidney also plays a major role in the homeostasis of body amino acid pools, which is carried out by the synthesis, degradation, filtration, reabsorption and excretion of amino acids in the renal tubules[5]. Therefore, it is natural that progressive alterations in renal function or metabolism can cause progressive effects on nutrition, as well as on other system organ system of the body.Once CKD develops, many kinds of metabolic changes due to kidney disease, underlying co-morbidities and dialysis procedure occur. Many factors lead to serious nutritional complications for CKD patients during the course of pre-dialysis and dialysis, which eventually affect the prognosis and quality of life of patients with CKD[6]. CKD is clinically divided into 5 stages based upon the GFR and signs of kidney damage[7]. Stage 5 CKD,

kidney failure or end-stage renal disease (ESRD), represents the total failure of the kidneys to maintain metabolic homeostasis, and that it is incompatible with life.

Malnutrition is usually defined as poor nutritional status resulting from poor nutrient intake. However in uremic patients there are many factors which interact in complex way that result in poor nutritional status and metabolic derangements. In these patients, serum and tissue proteins tend to be low despite recommended dietary protein and energy intake as per standard nutritional guidelines[8]. In addition, some CKD patients have low levels of protein stores regardless of their weight, while somemight be actually being overweight. Although there is no totally adequate definition for such a status in CKD patients, "uremic malnutrition" is the commonly used term[7]. Because of the many different diagnostic tools used in different studies, the prevalence of malnutrition varies widely among different reports, ranging from 20% - 50% at different stages of CKD[9]. This makes it necessary to assess the nutritional status of renal failure patients periodically and takes measures to prevent protein energy malnutrition. More elaborate method such as dual energy x-ray absorptiometry, bioelectrical impedance, near infrared interactance, may give reliable results but cost of these techniques limit their role on ground level[10].Several biochemical parameters are available for predicting malnutrition but these parameter have their own disadvantages[10,11].Keeping these things in mind modified subjective global assessment was designed to measure the nutritional status of patient. It is simple, reliable and dynamic tool can be used even by paramedical staff . We conducted this study with the sole objective to assess the nutritional status of patient with chronic kidney diseaseundergoing dialysis and compare that with result obtained by modified subjective global assessment.

Materials and Methods

Study setting ,Sampling and Study participants: This was a cross sectional study conducted in the renal unit of department of medicine of a tertiary care institute. The total duration of study was 1 year divided into three phases. Duration of data collection was 8 months. Non-probability purposive sampling method was used to collect the participants for the present study. All patients with chronic kidney disease admitted to renal unit of medicine ward.For the purpose of study we defined Chronic Kidney Disease as any person with following clinical parameter 1.Kidney damage for >= 3 months, as evident by structural or functional abnormalities of the kidney with or without decreased GFR manifested by *either:* Pathological abnormalities or markers of kidney damage including abnormalities in the composition of blood and urine, or abnormalities in imaging tests. 2)GFR < 60ml/min/1.73m2 for >= 3 months, with or without kidney damage.**Inclusion Criteria: 1.** All patients of chronic kidney disease onhaemodialysis. 2. Patient who gave valid informed written consent for study.**Exclusion Criteria:** 1.HIV positivepatient 2. Pulmonary TBpatient 3.Patient whose modality of treatment changed from haemodialysis to either peritoneal dialysis or transplant.**Data Collection:** A pretested predesigned questionnaire was used to collect information on demographic, social, diseases related information, information about co-morbid condition etc. Patient responses to the modified Subjective Global Assessment (mSGA) questionnaire was recorded.Malnutrition status was assessed on 7 different components which were change in weight, dietary history, gastrointestinal symptoms, functional capacity, co morbidities ,and assessment of subcutaneous fat and signs of muscle wasting.All the patients included in the study underwent different anthropometric measurements. All the anthropometric assessment were done after dialysis was done. The weight was measured in kilograms at the end of the hemodialysis session.The patients were assessed without shoes on and with as little clothing as possible. We used an electronic scale for the weight measurements, which was pre-checked for its calibration. The patients' heights were obtained using a

stadiometer. These heights were used in combination with the weights to calculate the body mass index (BMI) for the nutritional assessment.The Triceps Skin Fold (TSF) was measured with the aid of an adipometer, two inches above the midpoint between the acromial process of the scapula and the olecranon. The UAC was measured (in centimeters) using an inelastic and non-extendable tape of length 150 cm, graduated in divisions of 0.1 cm, at the midpoint of the extended upper arm, i.e. at the same site where the TSF was obtained. All measurements were made on the opposite side of the arm to the arteriovenous fistula. The UAMC was calculated using the formula: UAMC (cm) = UAC (cm)-3.14 x TSF (cm). The biochemical evaluation was done in the pre-dialysis phase. The patients' nutritional characteristics were analyzed using descriptive statistics, with tabulation using the Microsoft Excel software. Frequency distributions of absolute and relative variables of interest were then analyzed accordingly. The data were also analyzed to make correlations between quantitative variables, by calculating the correlation coefficient (r).the ethical clearance was obtained from the institutes ethical committee before the start of present study.

Results

A total of114 patient with CKD were admitted to the ward and of them 53needed dialysis and finally 35fulfilling our inclusion criteria were enrolled in the present study. Of the total 35 patient 16 werefemale (45.7%) and 19 male patients (54.3%). Most of the patient study participants were in the age group of 30-60 years (65.7 %) with ages ranging from 29 to 75 years and were Hindu(54.3%). The proportion of patients with different co-morbid conditions was Diabetes (40.0%), Hypertension(57.1%), anemia(88.8%), and albuminuria(40.0%).

Table 1:Different characteristic of study Participant (n=35)

Characteristics	**n (%)**
Age	
<30 Years	10(28.6)
30-60 Years	23(65.7)
>60 Years	2(5.7)
Gender	
Male	19(54.3)
Female	16(45.7)
Religion	
Hindu	19(54.3)
Muslim	11(31.4)
Others	5(14.3)
Co-morbid conditions	
Diabetes	14(40.0)
Hypertension	20(57.1)
Anaemia	31(88.8)
Albuminuria	14(40.0)

Table 2: Degree of malnutrition according to the various characteristics of study participants (n=35)

Characteristics	No Malnutrition	Mild & Moderate Malnutrition	Severe Malnutrition
Age			
<30 Years	3(8.6)	5(14.3)	2(5.7)
30-60 Years	7(20.0)	13(40.0)	3(8.6)
>60 Years	1(2.9)	1(2.9)	0(0.0)
Gender			
Male	7(20.0)	9(25.7)	3(8.6)
Female	4(11.4)	10(28.6)	2(5.7)
Diabetes			
Present	3(8.6)	9(22.8)	2(5.7)
Absent	8(22.8)	10(28.6)	3(8.6)
Hypertension			
Present	4(11.4)	12(28.6)	4(11.4)
Absent	7(20.0)	7(20.0)	1(2.9)

About Table-2 here

Overall 11(31.4%) patient didn't had any degree of malnutrition, 19(54.3%) participants had mild to moderate degree of malnutrition and 5(14.3%) had severe malnutrition(not shown in table). Most of the participants who had severe malnutrition were males (8.6%), and belonged to the age group 30-60 years of age(8.6%). Similarly most of those who didn't had any degree of malnutrition were also in the age group of 30-60 years of age and were males. The proportion of diabetic participants who had mild-moderate and severe degree of malnutrition was 22.8% and 5.7% respectively. While the proportion of hypertensive who had mild-moderate and severe degree of malnutrition was 28.6 % and 11.4 % respectively.

Table 3: Degree of malnutrition as per different method to measure malnutrition(n=35)

Indices	Nutritional status	n (%)
BMI (Kg/m^2)	Obese	1(2.9)
	Overweight	3(8.5)
	Normal	4(11.4)
	Under-Nutrition	27(77.2)
MAC (cm)	No Malnutrition	9(25.7)
	Mild to Moderate	23(65.7)
	Severe Malnutrition	3(8.5)
TSF (mm)	No Malnutrition	8(22.3)
	Mild to Moderate	26(74.3)
	Severe Malnutrition	1(2.9)
MAMC (cm)	No Malnutrition	11(31.4)
	Mild to Moderate	21(60.0)
	Severe Malnutrition	3(8.5)
Serum Albumin (gm/dL)	No Malnutrition	8(22.3)
	Mild to Moderate	25(71.4)
	Severe Malnutrition	2(5.7)

About Table 3 here

Table 3 details the degree of malnutrition as measured by different method of assessment.

Discussion

It is of vital importance to establish the correct nutritional status in a patient with CKD in order to improve the quality of life to the highest level. But doing so is a complexprocess despite the simplicity of the techniques. In patients with chronic kidney disease, such evaluations also present greater difficulty because these patients is much more susceptible to variations such as metabolic and hydro-electrolytic factors. A total of 35 study participants were enrolled in the present study. Of the total 35 patient 16 were female (45.7%) and 19 male patients (54.3%). The proportion of patients with different co-morbid conditions was Diabetes (40.0%) , Hypertension(57.1%), anemia(88.8%), and albuminuria(40.0%). Overall 11 (31.4%) patient didn't had any degree of malnutrition, 19 (54.3%) participants had mild to moderate degree of malnutrition and 5(14.3%) had severe malnutrition. The proportion of diabetic participants who had mild-moderate and severe degree of malnutrition was 22.8% and 5.7% respectively. While the proportion of hypertensive who had mild-moderate and severe degree of malnutrition was 28.6 % and 11.4 % respectively.In the present study, the frequency of mild &moderate malnutrition ranged from 60.0 % to 74.3 %, depending on the criterion used. As per BMI criteria the proportion of obese and severely malnourished participants were equal(2.9%) and only 4(11.4%) participants had the correct BMI range.

Limitations

Present study is cross sectional study a longitudinal study can asses relationship between nutritional parameters and Indian CKD patient. In present study most of the patients were from low socio economic status, so effect of socio economic status could not be assessed which could have profound impact on nutrition. The main limitation of this study relates to the fact that it was based on a single measurement of anthropometric and biochemical parameters, made after the start of the replacement renal therapy. For greater precision, anthropometric evaluations must be performed continuously among patients on hemodialysis, so that over a period of time, these patients can serve as their own control, given that there are no specific reference values for patients in this condition. The same applies to the biochemical parameters, which are more subject to errors when punctually documented, as performed in this research.

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