Research Article

Evaluation of Nutritional Status of Chronic Kidney Disease Patients Undergoing Hemodialysis

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ABSTRACT

Background: Chronic kidney disease caused by deterioration of renal function is a growing problem in the world. In chronic kidney disease, renal function is decreased and waste can build to high level in blood. Malnutrition is common in chronic kidney disease patient who is related to poor food intake because of anorexia, restricted protein intake, nausea and vomiting.

Objective: This study aims to assess the nutritional status of chronic kidney patients undergoing hemodialysis by anthropometric measurement and laboratory investigations.

Materials and Methods: A cross-sectional study was conducted in Human Organ Transplant Center, Bhaktapur, Nepal over a period of 3 months (December, 2016 to February, 2017). Total of 53 patients (25 male and 28 female) undergoing hemodialysis were included in this study. Anthropometric measurements like body mass index, mid-upper arm circumference and laboratory investigation like serum albumin was used to evaluate the nutritional status of chronic kidney patients. The data were analyzed using SPSS version 16.0.

Results: Mean age of study population was 43.07±16.1 years. Majority of study subjects belong to age group between 17-61 years (64.16%). On the basis of World Health Organization body mass index classification, 24.52% of patients had fallen in malnourished class whereas 64.15% of the patients had normal nutritional status. Similarly, on the basis of mid-upper arm circumference, 52% of the male patients and 75% of the female patients were malnourished. 54.72% of the patient's calorie intake was below 1200 Kcal. 56.6% of the patients had low serum albumin indicating malnutrition.

Conclusion: In conclusion, this study showed

that malnutrition is a common problem in our patients with chronic kidney disease undergoing hemodialysis. Inadequate intake of energy and nutrients, low MUAC values, low BMI and low serum albumin concentration increases the degree of malnutrition.

Keywords: Anthropometric measurements, Chronic Kidney Disease, Hemodialysis, Nutritional status.

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INTRODUCTION

Chronic kidney disease (CKD) is a growing public health problem in the world.[1] More than 60 million people are dying worldwide annually due to kidney failure.[2] In chronic kidney disease, renal function is decreased and levels of waste product increases in the blood. There are many causes of CKD such as diabetes, high blood pressure, glomerulopathies, frequent use of pain killer and other disorders.[3]

Malnutrition is common in CKD patient.[4] It is associated with increased risk of mortality and morbidity in CKD patient undergoing hemodialysis. Many factors play role for malnutrition in CKD patient undergoing hemodialysis which include adequacy of dialysis, restricted dietary intake and recurrent infections.[5] It is essential to assess nutritional status of CKD patients to prevent malnutrition and to indicate appropriate intervention in malnourished patients as well as success of dialysis depends on adequate nutrition.[6] Nutritional status of CKD patients can be detected by simple tools such as dietary records, anthropometric measurements like height, weight, body mass index (BMI), history of weight change, mid-upper arm circumference (MUAC) and measurement of serum albumin.[7] This study aims to assess the nutritional status of chronic kidney disease patients undergoing hemodialysis by using anthropometric measurements and laboratory investigations.

MATERIALS AND METHODS

This was a descriptive cross-sectional study conducted at Human Organ Transplant Centre (HOTC), Bhaktapur over a period of 3 months (December, 2016 to February, 2017). Fifty three chronic kidney disease patients of all age groups and both sexes undergoing hemodialysis were included in this study. This study was approved by the ethical committee of HOTC and written informed consent was taken from the study participants. Persons with chronic liver disease, congestive heart failure, malignancy, tuberculosis and refusal to cooperate were excluded from the study. In all these patients, detailed clinical history and detailed clinical examination was carried out. For dietary assessment, each patient was interviewed for the consumption of food and beverages using 24-hour recall method and food frequency. The responses were recorded through the questionnaires. The portion sizes of foods consumed by each patient were converted into percent carbohydrates, fats, proteins and Kcal. The average of three measurements of body weight, height, and MUAC were measured in all patients. BMI was calculated in all patients. 3ml venous blood was collected in vacutainer under aseptic condition for biochemical analysis. Serum albumin was measured by colorimetry assay using Bromocresol green method. All variables were presented as number and frequency and were arranged in tables and

figures. Statistical analysis was done by SPSS software (Statistical Package for the Social Sciences, version 16.0, SPSS Inc, Chicago, USA).

RESULTS

Out of 53 CKD patients undergoing hemodialysis, 25 (47.17%) were male and 28 (52.83%) were female. The ratio of male and female was found to be 0.89:1. The age range of the patients was 17-76 years. The mean age of study sample was 43.07±16.1 years. Majority of study subjects belong to age group between 17-61 years (64.16%) as shown in Table 1.

Table 1: Distribution of cases in various age groups in male and female

Age (in years)	Male	Female	Total	Percentage %
17-31	10	7	17	32.08
32-46	6	11	17	32.08
47-61	5	6	11	20.75
62-76	4	4	8	15.09
Total	25	28	53	100

Table 2: Anthropometric data of the study sample

Factors	Mean	±Standard deviation (SD)
Weight (kilogram)	50.58	8.61
Height (meter)	1.56	0.11
BMI (kg/m2)	21.03	3.94
MUAC (cm)	21.66	2.7

From table 2, the mean weight and height of the CKD subjects were 50.58±8.61kg and 1.56±0.11cm respectively. The mean values of BMI and MUAC were found to be 21.03±3.94 and 21.66±2.7cm, respectively.

Table 3: Food intake pattern of respondents (n=53)

Variables	Frequency	Percentage (%)
Food frequency		
Three times a day	5	9.43
Four times a day	32	60.38
More than four times a day	16	30.19
Fruit intake		
Daily	6	11.32
Sometimes	39	73.58
Don't eat fruit	8	15.09
Calorie intake pattern (Kcal)		
below 1200	29	54.72
1201-1400	12	22.64
1401-1600	8	15.09
1601-1800	2	3.77
1801-2000	2	3.77

Regarding the food intake pattern, out of 53 CKD patients, 32 (60.38%) had food frequency more than four times a day while 73.58% consumed fruits sometimes only. 54.72% of the patient's calorie intake was very low i.e., below 1200 Kcal, 22.64% of the patients take 1201-1400 Kcal, 15.09% take 1401-1600 Kcal and 7.54% of the patients take 1601-2000 Kcal per day.

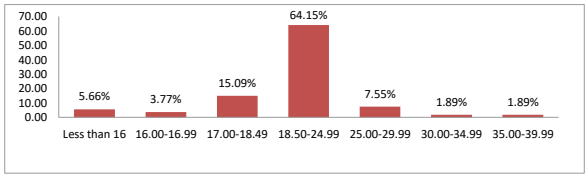

Figure 1: BMI category of the respondent

Out of total 53 CKD patients, 34 (64.15%) had normal BMI between 18.5 to 24.99, 13 (24.52%) had fallen in underweight (malnourished) class as their BMI is less than 18.5, 4 (7.55%) of the patients were overweight (pre-obese) and 1 (1.89%) were obese class I and class II each (Figure 1).

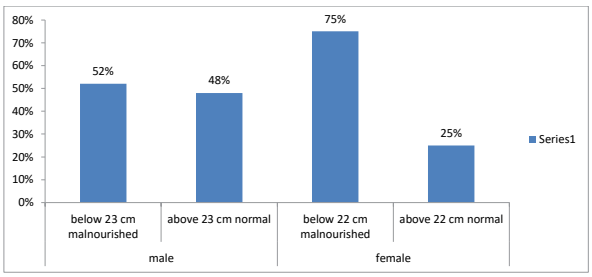

Figure 2: Mid Arm Circumference (MAC) of the respondents

On the basis of MAC, 13 (52%) out of 25 male patients and 21 (75%) out of 28 female patients were malnourished as shown in Figure 2.

Table 4: Biochemical report of respondents (n=53)

Albumin level	Frequency	Percentage (%)
Below 3.5 gm/dl	30	56.6
3.5-5.5 gm/dl (normal range)[8,9]	23	43.4

Thirty (56.6%) respondents had low serum albumin whereas 43.4% has normal albumin level as shown in Table 4.

DISCUSSION

Malnutrition is a common problem in CKD patient undergoing hemodialysis. Their body weight is reduced and serum albumin is low.[4] The causes of protein-energy malnutrition in CKD patients is multifactorial and includes: inadequate food intake, hormonal and gastrointestinal disorders, dietary restrictions, drugs that alter nutrient absorption, insufficient dialysis, and constant presence of associated diseases.[10] Therefore, assessing the nutritional status of patients is essential both to prevent malnutrition and to indicate appropriate intervention in malnourished patients.[10,11] Several methods for evaluation of nutritional status are available. Some of the methods are costly and time consuming. In this study, anthropometric measurement and laboratory analysis were used to evaluate the nutritional status of chronic kidney disease patients.

In this study, most of the patients were between the age group 17-46 years and mean age was 43.07±16.1 years which is similar to a study conducted at Saikh Zayed Hospital, Lahore where mean age was 43 years and majority of the patients was between 21 to 50 years of age.[12] This is in sharp contrast to the study performed in Srilanka by Adikari AMNT which reported that the mean age of study sample to be 59.07±4.2 years and majority of CKD patients age was more than 45 years.[13]

Regarding the calorie intake pattern 54.72% of the patient's calorie intake was very low i.e. below 1200 Kcal, 22.64% of the patients take 1201-1400 Kcal, 15.09% take 1401-1600 Kcal and 3.7% of the patients take 1601-2000 Kcal per day. Inadequate intake of energy and nutrients may be due to poor appetite levels of the patients. This poor appetite is one of the central factors in compromising nutritional status of CKD patients, as it reduces the dietary intake which may leads to malnutrition.[14]

Anthropometry has long been used as indicator of nutritional status because it is non-invasive and less expensive. Anthropometric measurements help in calculating both BMI and MUAC, which provide a simple and convenient value for assessing nutritional status. Anthropometric measurement was done.[15] In the present study, according to WHO BMI classification,[16] 64.15% of the CKD patients had normal BMI between 18.5 to 24.99, 24.52% had BMI less than 18.5 indicating malnutrition. Our study is similar to the study done in Karnataka, India by Nagabhushana et al. in which they had reported that 55% of CKD patients had BMI

between 18.5 to 24.9 and 17% had BMI less than 18.5.[17] In contrast to our study, a hospital-based study was carried out by Hajira et al. in Rehman Medical Institute, Peshawar, Pakistan which showed that 54% of the hemodialysis patients had low BMI indicating malnutrition.[18]

On the basis of MUAC, 52% of our male patients and 75% of the female patients were malnourished. A similar study was done by Liman and his colleagues also reported that malnutrition was seen in 17.7% of patients with CKD on the basis of BMI and on the basis of MUAC, 51% of the patients were malnourished in their study done in Nigerian patients.[19] Recent study (2019) done by Bhattacharya and her colleagues in West Bengal, India also strongly support our study in which she had shown that 42.9% of male and 70.2% of female had malnutrition on the basis of MUAC.[15]

In the present study 56.6% of the patients had low serum albumin i.e., below 3.5gm/dl and 43.4% of the patients had normal serum albumin level (3.5-5.5 gm/dl). Similar observation was documented previously in some parts of China by Zhang et al. in which they had reported 53.72% of CKD patients with albumin level below 3.5 gm/dl.[20] In the year 2012, a study was conducted by Schmidt et al. in which hypoalbuminemia was seen in 39% of CKD patients.[21] This low serum albumin is one of the most widely used biomarker in assessing nutritional status of CKD patients. Serum albumin is a reliable index of malnutrition. A low serum albumin level in dialysis patients are primarily associated with systemic inflammation, and are caused by a combination of a reduced synthesis and an increased degradation of albumin.[22,23]

CONCLUSION

In conclusion, this study showed that malnutrition is a common problem in our patients with chronic kidney disease undergoing hemodialysis. Inadequate intake of energy and nutrients, low MUAC values, low BMI increases the degree of malnutrition. The prevalence, however varies according to the nutritional parameter utilized. Similarly, our study found that the lower serum level of albumin was associated with the reduced kidney function. In this study, markers of chronic inflammation were not measured, thus their contribution to the hypoalbuminemia state in these patients limits our conclusions. We, hereby recommend that the assessment of nutritional status and regular monitoring of biochemical parameters should be part of routine evaluation of all CKD patients.

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Conflicts of Interest: The authors declare no any conflict of interest.

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