

Nutritional Status of In-patients with Chronic Kidney Diseases in Sri Lanka

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ABSTRACT

Under-nutrition is a serious and common complication of patients with Chronic Kidney Disease (CKD). This study was designed to assess the nutritional status of hospitalized patients with Chronic Kidney Disease (CKD) at the pre-dialysis stage. Twenty-nine inward CKD patients (10 males and 19 females) with a mean age of 59 (SD=±4.2) years were recruited. An interviewer administered pre-tested questionnaire, patients' bed-head tickets and semi-quantitative food frequency questionnaire were used as the data collection tools. Body weight and height were measured following standard techniques to assess the nutritional status. Dietary intake was analyzed by using Food base 2000 software. Statistical analysis was done by using Minitab 14. Although the mean Body Mass Index (BMI) (21.85 + 3.92 kg m⁻²) was within the normal range (18.5-22.9 kg m⁻²), 21% of the sample was underweight (BMI < 18.5 kg m⁻²). The mean energy intake was 29.46 + 7.65 kcal/kgBW/day, which was below the Recommended Dietary Allowance (RDA) of 30-35 kcal/kgBW/day. The mean protein intake was 0.77+0.19 g/kgBW/day and was within the RDA (0.6-0.8 g/kgBW/day). The study concludes that 21% of the sample was underweight. Almost all the subjects did not consume adequate energy and it may be due to poor appetite levels. Therefore, monitoring nutritional status of patients is more important to ensure appropriate nutrition support in a timely manner, to prevent or minimize the development of malnutrition prior to dialysis.

Key words: Chronic kidney disease, nutritional status, patients, pre-dialysis, underweight

INTRODUCTION:

Background: Renal failure is a medical condition in which the kidneys undergo cellular death and are unable to filter wastes and maintain fluid balances. This dysfunction causes a build-up of toxins in the body which can affect the blood, brain and heart, as well as other complications. This inadequate filtration of toxins and waste products from the blood lead to renal failure and to end stage renal failure. It is an emerging health problem in Sri Lanka and

is often combined with poor health outcomes and high economical cost on patient, family, community and health system.

Studies conducted from 2001 to until now revealed that endemic occurrence of a kidney disease have been increasing over a period of 10–15 years and the prevalence of kidney disease varies from 2 to 3% of the population in Sri Lanka (Rohana *et al.*, 2010). Mortality due to CKD is being the 11th leading cause of mortality in the country. The disease commonly manifests in male farmers of low socio-economic class. However, the disease is also observed among women and young children in some parts of the affected regions (Aturaliya *et al.* 2006).

The geographical distribution of CKD appears toward the North Central Region (NCR) of the country in which North Central, part of North Western and part of Uva provinces are included. High prevalence has been observed at Medawachchiya, Padaviya, Dehiattakandiya, Girandurukotte, Medirigiriya and recently Nikawewa in North Central Province of Sri Lanka (WHO, 2009). Approximately 2000 patients are being added annually to the disease burden and approximately 300-600 deaths occur in hospitals due to chronic kidney disease annually (Rohana, C *et al.*, 2010). Mortality rate could be higher than this because home deaths are not included in death registries.

The disease is characterized by a slow, progressive, asymptomatic development, frequently starting at a younger age group specially be more prevalent among men engaged in agriculture. As the disease progresses slowly and majority of patients do not have any symptoms until they are in the late stages of the disease. At the last stages of the disease the quality of life of the patients become very poor and the mortality rate is almost 100% if they are unable to find a suitable donor in time for a kidney transplant. Almost most patients are within the age group of 30 – 60 years, with a male the majority being paddy farmers (WHO, 2008). The risk factors that increase the risk of chronic kidney failure include diabetes, high blood pressure (hypertension), heart disease, smoking, obesity, high cholesterol and a family history of kidney disease (Gooneratne *et al.*, 2010).

In 2005, about 350 million rupees, 4.6% of the annual health budget was spent on the management of patients with renal failure (WHO, 2008). This amount was allocated for kidney disease clinics for identification and management of patients, pharmaceuticals, maintenance dialysis for the patients with end stage renal disease, and kidney transplantation (Rohana, 2010).

Poor appetite is one of the central factors in compromising nutritional status of in CKD patients, as it reduces the dietary intake. Malnutrition present in up to 48% of patients at the

time of dialysis initiation and the deterioration of the nutritional status may lead to the early onset of the renal replacement therapy (WHO, 2009).

Appropriate assessment of the nutritional status is essential in order to implement effective and timely nutrition intervention. Therefore, monitoring nutritional status of patients is more important to ensure appropriate nutrition support in a timely manner, to prevent or minimize the development of malnutrition prior to dialysis (Campell, 2007).

Objective:

Therefore, this study was carried out to assess the nutritional status of patients with pre-dialysis chronic kidney disease treated at Sri Jayewardenepura general hospital, Sri Lanka.

METHODOLOGY:

The study was conducted as a descriptive cross sectional study at the renal ward in Sri Jayewardenepura hospital. Twenty nine inwards patients with CKD who were hospitalized during the data collection period selected as a study sample. Ethical clearance for the study was obtained from the Ethics Review Committee of Sri Jayewardenepura General Hospital. The study was briefly explained to the patients and only patients who were willing to participate the study and had been diagnosed with CKD were recruited. An interviewer administered questionnaire, patients' bed-head tickets and semi-quantitative food frequency questionnaire were used to collect data on socioeconomic status, biochemical parameters and dietary intake. Body weight, height, Mid Upper Arm Circumference (MUAC) and Triceps Skin-fold Thickness (TST) were measured according to standard techniques and Body Mass Index (BMI) was calculated by dividing the body weight in Kg by height² in Meter. Dietary data were analysed by using food composition database. Statistical analyzed was done using Minitab 14 version.

RESULTS:

Twenty-nine CKD patients (10 males and 19 females) were recruited to the study and the mean age of the study sample was 59 (± 4.2) years. The majority (86.2%) of the patients' age was more than 45 years.

A Table 1 shows anthropometric, dietary and bio chemical data of the study sample and the figure 1 shows the distribution of the sample according to their nutritional status, determined the body mass index as a criterion.

Table 1: Anthropometric, dietary and bio chemical data of the study sample

Factors	Total(n=29)		Male(n=10)		Female(n=19)		P value	RDA/Normal range
	Mean	±SD	Mean	±SD	Mean	±SD		
Weight (kg)	53.23	13.45	57.80	11.87	48.54	10.27	0.07	
Height (m)	1.54	0.07	1.59	0.06	1.50	0.06	0.001	
TSF (mm)	13.24	4.07	13.45	3.98	13.13	2.23	0.81	
MUAC(cm)	25.65	4.00	26.10	4.40	25.41	3.88	0.66	
BMI (kgm ⁻²)	21.85	3.92	22.70	4.34	21.35	3.65	0.73	18.5-22.5
Total energy intake (kcal/KgBW/Day)	29.46	7.65	27.33	7.06	30.58	7.89	0.32	30-35
Protein intake (g/KgBW/Day)	0.77	0.19	0.70	0.17	0.81	0.19	0.24	0.6-0.8
Serum Creatinine (µmol/L)	497.8	178.9	514.5	203.1	489.0	170.0	0.70	<124
Serum Albumin (g/dL)	6.11	0.5	6.05	0.54	6.13	0.12	0.68	3.8-5.3
Blood Urea (mg/dL)	86.38	42.37	87.1	47.8	86.1	40.64	0.84	10-50

RDA: Recommended Dietary Allowances, TST: Triceps Skin-fold Thickness, MUAC: Mid Upper Arm Circumference (MUAC), BMI: Body Mass Index, KgBW: Kilogram Body Weight

There is no significant difference in the mean values of anthropometric measures, dietary intake and biochemical parameters of males and females CKD subjects.

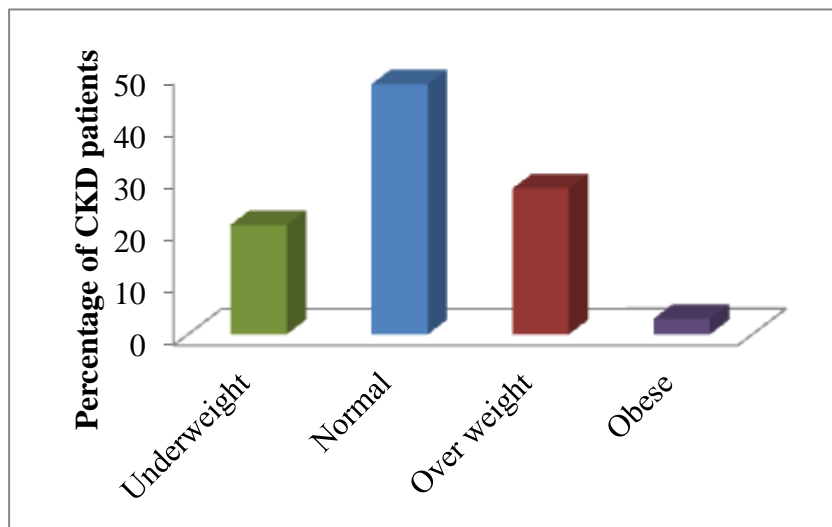


Figure 1: Distribution of the study sample according to their nutritional status based on BMI

The mean Body Mass Index (BMI) of the sample was $21.85 \pm 3.92 \text{ kg m}^{-2}$ and 21% of the sample's BMI was less than 18.5 kg m^{-2} . The results revealed that the mean BMI of the study sample was within the normal range and there were no significant differences between males and females BMI values. However, 21% of the study sample was underweight.

The mean MUAC of the patients was $25.65 \pm 4.0 \text{ cm}$ while the mean TST was $13.24 \pm 4.00 \text{ mm}$. Further, correlations were observed in BMI with MUAC ($r=0.45$) and TST ($r=0.39$).

Dietary nutrient intake of the study sample revealed that the mean intake of the energy, protein, potassium, sodium were 29.46 ± 7.65 kcal/kgBW/day, 0.77 ± 0.19 g/KgBW/Day, 1.14 ± 0.26 g/Day, 0.91 ± 0.32 g/Day respectively.

Biochemical parameters of the subjects showed that the mean serum creatinine, serum albumin and blood urea levels were 497.8 ± 178.9 μ mol/L, 6.11 ± 0.5 g/dL and 86.38 ± 42.37 mg/dL respectively.

DISCUSSION:

In this study, the majority (86.2%) of chronic kidney disease patients' age was more than 45 years (mean 59 ± 4.2). This result showed that CKD occurs at an earlier age compared to the findings reported in the United States with an average age of 63 years (Gelber *et al.*, 2005).

Malnutrition is a common problem in chronic kidney disease patients as seen in this study in which 21% of the patients were rated as being malnourished using BMI as a criteria. Al Saran and his colleagues similarly reported malnutrition of only 4% of the patients using BMI as a nutritional assessment tool (Al Saran *et al.*, 2011). This is in sharp contrast to 21 % as seen in this study. Agaba *et al.* also reported a malnutrition prevalence rate of 21.6% using BMI in a sample of chronic kidney patients who are yet to commence dialysis in Jos, Nigeria (Agaba, 2004).

While MUAC is suggesting a marked reduction in muscle bulk and somatic protein stores, TST suggesting substantial loss of fat or energy stores. Therefore, MUAC and TST are the good indicators/ measurements in the assessing nutritional status of the subject.

According to Baker *et al* in 1982, in this study the patients with triceps skin fold thickness <5 th percentile (less than 10mm in males and 13 mm in females) and mid upper arm circumference less than 22 cm in females and 25 cm in males were considered as malnutrition. According to the mean values of the TST and MUAC of the study sample, patients could not be rated as being malnourished.

Dietary information revealed that the mean energy intake was below the Recommended Dietary Allowance (RDA) of 30-35 kcal/kgBW/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. However, their mean protein intake was within the RDA (0.6-0.8 g/kgBW/day). The reason for having adequate protein may be due to the advice on protein intake restriction and consuming plant based protein (pulses and legumes) rich hospital diet. As they received low potassium diet from hospital, their potassium intake was also in acceptable level.

Serum creatinine level was four times higher than the normal range while serum albumin level and blood urea level were also higher than normal range. These higher biochemical values indicated that very poor functional capacity of the kidneys in relation to clearance of nitrogenous waste products in the body.

Several reasons have been suggested as possible causes of malnutrition in patients with chronic kidney disease. These include inadequate dietary intake of calories and protein as well as increased catabolism of protein from chronic inflammation (Carrero et al., 2008 and Utaka et al., 2005). Malnutrition is associated with poor quality of life, impaired immune defence mechanism, as well as poor clinical outcomes (Henn and Cano, 2010).

CONCLUSION:

In conclusion, 21% of the studied sample was underweight and twenty patients out of twenty nine did not meet their energy requirement.

Monitoring nutritional status of patients with CKD is more important to ensure appropriate nutrition support in a timely manner to prevent or minimize the development of malnutrition prior to dialysis.

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