Dietary Intake and Nutritional Status of Dialysis and Non-dialysis Patients in Selected Specialized Hospitals of Dhaka City

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Abstract

The objective of this cross-sectional study was to evaluate dietary intake and nutritional status of chronic renal failure patients with and without dialysis. A total of 105 subjects from three different specialized hospitals located in Dhaka city were included in this study. The subjects were selected purposively. Fifty-nine patients were on dialysis whose median age was 56 years, and forty-six patients were without dialysis whose median age was 52 years. An interviewer administered questionnaire was developed to obtain socio-demographic, anthropometric, and dietary data. Dietary intake was obtained by 24-hour recall. The findings of this study showed that 8.5% of the patients on dialysis were underweight and 39% were overweight while prevalence of underweight and overweight in non-dialysis patients was the same (17.4%). More than 40% of these chronic renal failure patients were found to have no knowledge about potassium rich foods and only 20% were found to have good knowledge about potassium rich foods. Majority of the patients (about 70%) do not have knowledge about uric acid rich foods irrespective of dialysis and non-dialysis condition. Mean intake of different food groups were not significantly different between two groups except that egg consumption was significantly higher (p=0.01) for dialysis group. Estimated average energy intake was about 17 kcal/kg/day in dialysis patients and 18 kcal/kg/day in non-dialysis patients. Mean protein intake was 0.95g/kg/day in dialysis and 0.85g/kg/day in non-dialysis patients. No significant difference regarding macro and micro nutrients intake was observed between two groups. All the patients were found to have lower intake of energy than the recommended level. About 68% of dialysis patients and 76% of non-dialysis patients were found to have protein intake below the recommended level. It can be concluded that prevalence of overweight was high in dialysis patients while malnutrition was prevalent in non-dialysis patients. Knowledge about the sources of potassium and uric acid rich-food amongst the subjects was very poor. The consumption of nutrients among the patients belonging to both groups was also grossly inadequate and below the recommended level.

Key words: Dialysis, Non-dialysis, Body Mass Index, Nutrient intake.

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Introduction

Chronic Kidney Disease (CKD) is defined as either kidney damage or a turn down in renal function as determined by decreased Glomerular Filtration Rate (GFR) for three or more months. National Kidney Foundation guidelines have classified CKD into five stages, each of which directly correlates with the severity of the disease [1]. The concluding stage of chronic kidney disease, known as end stage renal disease (ESRD), represents the most severe manifestation [2]. Malnutrition is a common aspect in end-stage renal disease patients on continuance hemodialysis. There is increasing evidence linking poor nutritional status to increased morbidity and mortality in patients on dialysis [3, 4].

Nutritional management in renal disease presents number of challenges for clinicians since renal disease can both directly and indirectly influence nutritional status. Evidence suggests that the outcome of dialysis depends on the adequacy of the dialysis treatment and the nutritional status of the patient which is typically depend on the dietary intake of the patients [5, 6]. Assessment of dialysis adequacy and dietary intake has become an important issue till now. The hemodialysis (HEMO) study has revealed that dialysis patients have insufficient intakes of energy and protein [7]. The CKD patients have not only inadequate intake of macronutrient but also inadequate intake of vitamins and minerals. As loss of renal function affects nearly all other organ systems, it may even worsen the losses of vitamins or trace minerals. These cumulative changes lead to malnutrition including a decrease in the uptake and utilization of vitamins and minerals [8].

There are limited data regarding dietary intake and nutritional status of dialysis and non-dialysis patients in Bangladesh. The present study was aimed to evaluate the dietary intake and nutritional status of chronic renal failure patients who were on dialysis or without dialysis.

Materials and methods

Study design and subjects: The study was cross-sectional in design and was conducted from August 2009 to December 2009. Overall, 105 patients were included in this study, of which 59 renal patients were on dialysis and 46 were without dialysis. Patients were enrolled from 3 different hospitals of Dhaka city named National Institute of Kidney Diseases and Urology (NIKDU), Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM) and United Hospital. The patients were included on the basis of the information about them having chronic renal failure and having not gone through any transplantation and/or surgery before and during the study time. Informed written consent was procured from every subject.

Anthropometric Measurements: Anthropometric measurements, height and weight, were collected from the hospital record of the patients. BMI was then calculated

using the formula-weight in kg / height in m^2. Adult with a BMI < 18.5 kg/m^2 were defined as underweight.

Dietary information: Individual 24 hour dietary recall method was used to obtain the total amount of food available for consumption and also to determine the usual intake of the nutrients of interest for renal failure patients. Detailed description of all foods and beverages consumed, including cooking methods were recorded for each individual kidney patients. The subjects were also assessed in terms of their knowledge about foods rich in potassium and uric acid. Knowledge of the subjects was ranked as good, fair, poor and no knowledge. If the patient knew more than 5 foods rich in potassium (lentils, green vegetables, green coconut, orange, potato, red meat, tomato, nut etc.) or uric acid (lentils, beef, mutton, sea fish, fish, dry fish, nut etc.) he/she was ranked good; if knew 2-4 foods items, was ranked as fair and if knew 1-2 food items, was ranked as poor knowledge. Subjects who did not tell any food item assigned were graded as no knowledge. The nutrient values of the consumed foods were calculated by using nutrients composition database of Bangladeshi food published by HKI[9]. SPSS syntax file was used to convert food intake data into nutrients.

Statistical Analysis: After collecting data, the questionnaire was cross-checked to identify any discrepancy in information quality. The checked data were then cleaned, entered into the Statistical Package for Social Science spread sheet (SPSS, windows version-12.0). The data were then analyzed to produce descriptive statistics, expressed as mean with standard deviation or percentage. For inferential statistical analysis p-value less than or equal to 0.05 was considered significant.

Results

Characteristics of the study subjects are presented in **Table-1**. Most of the patients in the dialysis (54.3%) and non-dialysis (52.2%) were in middle adulthood age group (40-59 years). A female preponderance was observed among the participants in dialysis group (59.3%) while in non-dialysis group male and female were in equal share. The majority of the participants were married in both dialysis and non-dialysis group. In terms of occupation, home maker comprised the majority (47.5%) in dialysis group while in non-dialysis group retired persons (45.7%) represented the highest number. Most of the patients in both dialysis and non-dialysis group were literate while only few were illiterate. Patients suffering from renal diseases more than one year in dialysis group were higher than non-dialysis group. Prevalence of diabetes among the renal disease patients was quite high.

Table 1: Characteristics of dialysis and non-dialysis patients

Characteristics	Dialysis (n=59) %	Non-dialysis (n=46) %
Age		
14-39	13.5	19.6
40-59	54.3	52.2
60-69	32.2	28.2
Sex		
Male	40.7	50.0
Female	59.3	50.0
Physical activity level		
Sedentary	45.8	37.0
Moderate	54.2	63.0
Educational qualification		
Illiterate	6.8	13.0
Primary	42.4	47.8
Secondary	15.3	15.2
Graduate	36.5	24.0
Occupation		
Homemaker	47.5	32.6
Service, Business	20.3	21.7
Retired & Others	32.2	45.7
Marital status		
Unmarried	5.1	13.0
Married	94.9	87.0
Duration of renal diseases (year)		
<1	22.0	37.0
1-3	25.4	19.6
3-5	27.1	26.1
5 or more	25.4	17.4
Presence of diabetes	61.0	56.2

Mean weight, height and BMI of the patients are tabulated in **Table-2**. Weight and height were not significantly different but mean BMI was significantly (p=0.02) higher in dialysis patients than non-dialysis patients (24.0 vs. 22.0).

Table 2: Mean weight, height and BMI of the study subjects

Parameters	Dialysis group(n=59) Mean ± SD	Non-dialysis group(n=46) Mean ± SD	*p*-value
Weight (kg)	60.0 ± 11.4	57.0 ± 10.9	0.17
Height (meter)	1.59 ± 0.1	1.61 ± 0.1	0.20
BMI	24.0 ± 4.2	22.0 ± 3.4	0.02

Nutritional status based on BMI as depicted in **Figure-1** revealed that more overweight patients were in the dialysis group (39.0%) compared to the non-dialysis group (20.0%). More than half of the patients were normal both in dialysis (53.0%) and non-dialysis group (63.0%).

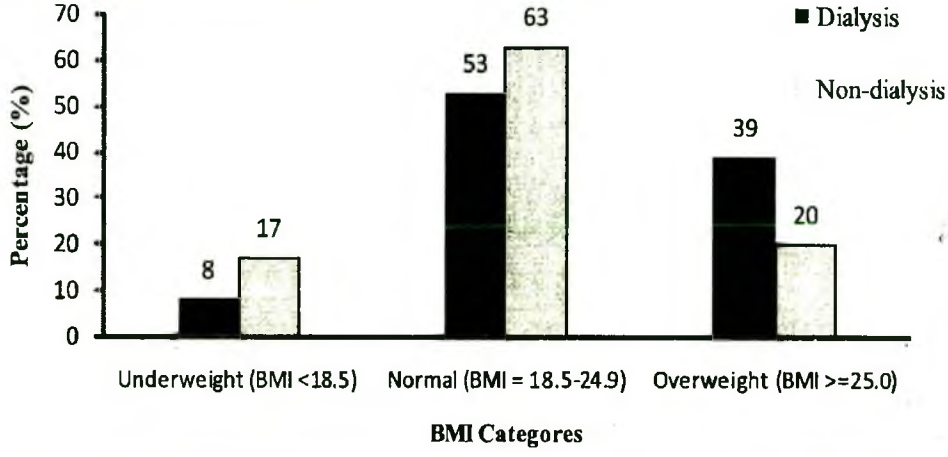

Figure 1: Nutritional status of dialysis and non-dialysis patients based on their BMI

Figure 2: Knowledge of the patient about foods rich in potassium

Figure-2 presents the knowledge of the patient about foods rich in potassium. It is quite noticeable that 44.1% in the dialysis group and 56.5% in the non-dialysis group were found to have no knowledge about foods rich in potassium. It is to be noted that about 71% people in both groups had no knowledge about foods rich in uric acid (**Figure-3**).

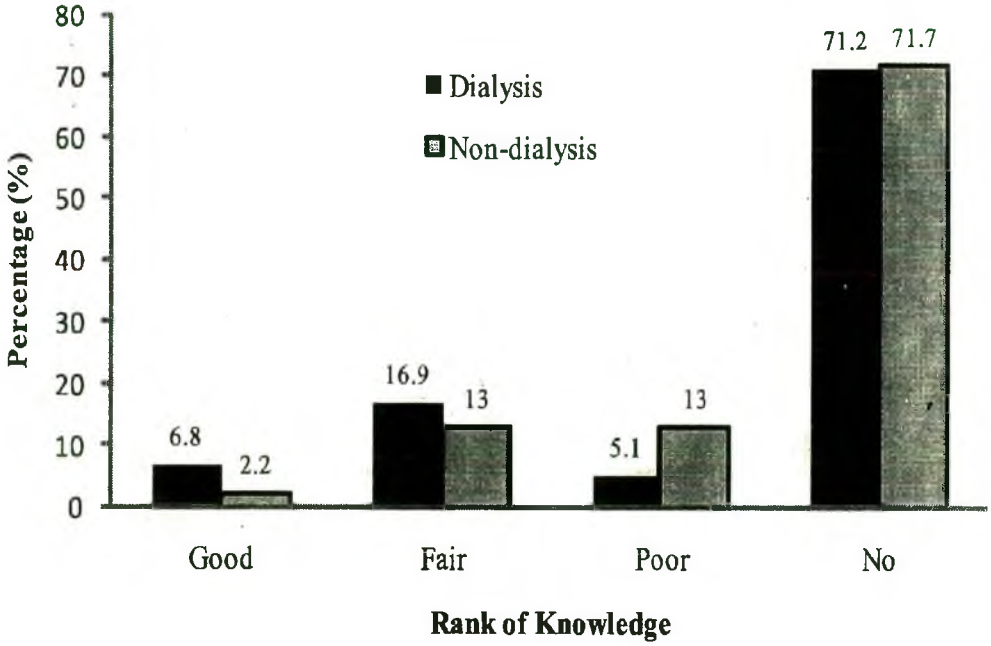

Figure 3: Knowledge of the patient about foods rich in uric acid

Table-3 depicts the mean intake of food from different food groups by dialysis and non-dialysis kidney patients. Among all the food groups, daily intake of cereals was found to be highest, followed by the consumption of vegetables, meats and poultry in both the dialysis and non-dialysis patients. No significant difference between the groups was found in consumption of selected food items except that the consumption of eggs was significantly ($p=0.01$) higher for dialysis group compared to non-dialysis ones.

Table 3: Mean consumption of selected food items by dialysis and non-dialysis kidney patients

Food groups (g/day)	Dialysis(n=59) Mean ± SD	Non-dialysis(n=46) Mean ± SD	*p*-value
Cereals	161.0 ± 81.0	166.0 ± 91.0	0.78
Pulses	2.44 ± 1.69	2.59 ± 1.89	0.67
Vegetables	105.0 ± 131.0	158.0 ± 151.0	0.06
Fruits	56.0 ± 96.0	32.0 ± 51.0	0.13
Meats and poultry	83.0 ± 139.0	75.0 ± 132.0	0.75
Eggs	47.0 ± 53.0	24.0 ± 35.0	0.01
Fish	51.0 ± 56.0	45.0 ± 62.0	0.17
Fresh milk	42.0 ± 118.0	96.0 ± 221.0	0.12

$P < 0.05$ was considered significant

Table-4 presents the energy and nutrients intake of the kidney patients. Average energy intake was found to be at about 17kcal/kg/day in dialysis patients and 18kcal/kg/day in non-dialysis patients. Mean protein intake was found to be 0.95 g/kg/day and 0.85 g/kg/day in dialysis and non-dialysis patients respectively. Mean calcium intake was around 382 mg/day in dialysis patients and 419 mg/day in non-dialysis patients. Sodium intake was about 300 mg/day in both groups excluding the intake from table salt. There was no significant difference in nutrient intake between the two groups of patients.

Table 4: Comparative nutrients intake of dialysis and non-dialysis patients

Energy and nutrients	Dialysis Mean± SD	Non-dialysis Mean± SD
Energy(*kcal/kg/d*)	17.4 ± 6.6	18.42 ± 7.1
Protein(*g/kg/d*)	0.9 ± 0.6	0.85 ± 0.5
Fat(*g/d*)	14.3 ± 8.1	14.46 ± 9.8
Zinc(*mg/d*)	5.6 ± 2.4	5.37 ± 2.5
Iron(*mg/d*)	13.7 ± 8.4	11.63 ± 5.7
Calcium(*mg/d*)	382.3 ± 267.3	419.39 ± 314.3
Sodium(*mg/d*)*	304.1 ± 182.0	297.23 ± 205.6
Potassium(*mg/d*)	1056.1 ± 677.6	1000.61 ± 597.1
Riboflavin(*mg/d*)	0.7 ± 0.5	0.63 ± 0.4
Thiamin(*mg/d*)	0.9 ± 0.4	0.91 ± 0.5
Niacin(*mg/d*)	12.2 ± 8.2	10.75 ± 6.1
Vitamin C(*mg/d*)	41.0 ± 45.3	39.89 ± 44.4

*Sodium consumed other than table salt

All the patients in both dialysis and non-dialysis group are deficient in energy and calcium compared to the recommended K/DOQI (2000) level of nutrients for kidney

patients (**Table-5**). About 68% of dialysis patients and 76% of non-dialysis patients were on protein intake below the recommended level. Near about 80% of the patients in both group were on lower intake of iron, potassium, thiamin, niacin and vitamin C.

Table 5: Percentage of dialysis and non-dialysis patients who are below their recommended nutrients intake as compared with the K/DOQI (2000) recommendation [10]

Nutrients	Dialysis (n=56) %	Non-dialysis (n=46) %
Energy	98.2	100.0
Protein	67.9	76.1
Zinc	98.2	100.0
Iron	71.4	78.3
Calcium	98.2	100.0
Potassium	78.6	84.8
Riboflavin	94.6	93.5
Thiamin	87.5	84.8
Niacin	78.6	87.0
Vitamin C	77.8	80.0

Discussion

In this study Prevalence of renal disease was estimated to be highest in the middle adulthood age group of 40-59 years and the percentage was more than half of the patients in both dialysis and non-dialysis groups. This finding is consistent with AusDiab kidney study[11] and Iceland study[12]. In a clinical study in Bangladesh on CKD patients a female preponderance was observed as was also observed in present study[13]. AusDiab kidney study also demonstrated a significant difference (p=0.002) between genders at stage 3 to 5 of CKD the prevalence being greater in women[11]. In present study almost (>90%) all of the patients were having moderate to sedentary activities.

Malnutrition in CKD patients, mostly termed as Protein-energy wasting (PEW), is patients the strongest amongst the interpreters of mortality in patients with CKD [14, 15]. Furthermore, studies related to the nutritional status have shown that malnutrition/wasting is common in CKD, and some studies have reported that around 18-75% of patients with CKD, undertaking maintenance dialysis therapy, showed sign of wasting [16, 17, 18]. In our study, only 8.5% patient in dialysis group was underweight based on BMI. This finding does not compare well with the findings

reported in other countries. Numerous factors are involved in the development of PEW [19]. The present study does not address all the factors. Besides this, non-randomization of the sample could be a possible reason for this. About 40% of the patients were overweight or obese in dialysis group.

Knowledge of the patients about foods rich in potassium and uric acid was assessed. About 45-57% of the patients were found to have no knowledge about potassium rich foods. About 29-30% of the patients were found to have fair knowledge about these foods. Surprisingly, the knowledge about uric acid rich foods was even worse with more than 70% of the patients having no knowledge about foods rich in uric acid.

The Kidney Dialysis Outcomes Quality Initiative (KDOQI) guidelines recommend a daily energy intake of 35 kcal/kg body weight for patients on peritoneal dialysis who are at age <60 years, 30–35 kcal/kg body weight for patients >60 years and daily protein intake of 1.2–1.3 g/kg body weight [10]. However, a large proportion of patients on peritoneal dialysis ingest a considerably lower amount of calories and protein than the recommended amounts [20]. This study also found a lower intake of energy and protein for both dialysis and non-dialysis patients. Average energy intake was found to be 17 kcal/kg/day in dialysis patients and 18 kcal/kg/day in non-dialysis patients. Mean protein intake was found to be 0.95 g/kg/day and 0.85 g/kg/day in dialysis and non-dialysis patients respectively. All the patients in both of the groups were found to have much lower energy intake than the recommended level. About 68% of dialysis patients and 76% of non-dialysis patients were found to have protein intake below the recommended level of intake. Similar picture was also reported in HEMO study where the mean dietary protein intake was 0.93 ± 0.36 g/kg/ day and the mean dietary energy intake was 22.9 ± 8.4 kcal/kg/day with 81% and 92% of the patients, respectively, having protein and energy intakes below the K/DOQI (2000) recommended values [7].

Mean consumption of sodium was found to be very low in present study. The primary reason behind this might be the fact that the present study does not report the table salt intake of the patients. Moreover, most of the patients (>60%) were suffering from hypertension that might lead them to a sodium restricted food habit avoiding sodium rich foods from their food list. For other nutrients like calcium, thiamin, riboflavin and niacin, the mean consumption was found to be lower than the RDA. The present study also revealed that about 80% of the patients in both groups were having lower intake of other essential nutrients such as iron, thiamin, niacin, and vitamin C. This deficit may play a crucial role in impairment of nutritional status of the kidney patients who are already otherwise affected.

It is to be noted that the study had several limitations. The small sample size and lack of random sample selection could have prevented generalization. Despite these shortcomings, this small scale research study provides valuable new insight into the prevalence of malnutrition, knowledge about risk nutrients and nutrient consumption

pattern among dialysis and non-dialysis kidney patients. These findings hold promise to help the dietary management for chronic renal failure patients.

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