Original Article

DIETARY PATTERN AND NUTRITIONAL STATUS AMONG CHRONIC KIDNEY DISEASE PATIENTS

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ABSTRACT

Background: Chronic kidney disease is recognized as a serious health problem in both developed and developing countries. In recent years, an increasing incidence of chronic kidney disease has been observed worldwide, and the number of patients need special attention. The study was conducted to assess the dietary pattern and nutritional status of the patient with chronic kidney disease.

Methods: A cross-sectional study was carried out among 253 respondents of National Institute of Kidney Disease and Urology (NIKDU) and Anwer Khan Modern Medical College Hospital, Dhaka. Data were collected by convenient sampling through face-to-face interview using a semi-structured questionnaire. For nutritional assessment, "Asian criteria" BMI cut-off was performed. Dietary pattern was assessed with food frequency questionnaire, number of major meals per day, light meal, skipped meal for last 7 days. Data were analysed by SPSS 25 software.

Results: The study found that highest number (23.7%) of the respondents were in age group 46 to 55 years and about 51% of the respondents were male. Assessment of nutritional status (BMI) of the respondents who were not oedematous (n=83) showed that 68.7% of the respondents were pre obese, 9.6% were obese and 14.5% were overweight. Among the respondents 85.4% took three meals a day and 53.3% took 1.5 litres of water daily, 68.8% of them did not take extra salt during meals, 36% of them strained vegetables in boiling water prior cooking. Older CKD patients (>45 years) showed higher proportion of obesity ($p<0.05$).

Conclusion: Dietary restrictions of CKD were followed by most of the respondents of this study. Most of the respondents who were assessed for BMI were overweight, pre obese and obese. Proportion of obesity increased with age.

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Key words: Chronic Kidney Disease; Dietary Pattern; Nutritional status

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INTRODUCTION

Chronic kidney disease (CKD) is recognized as an important non communicable disease in both developed and developing countries with a prevalence of approximately 8 to 16% in adult population [1,2]. In recent years, an increasing incidence of chronic kidney disease has been observed worldwide and the number of patients need special attention. At early stage of the disease

patients need costly medications, but as the disease progresses to an end stage kidney disease (ESKD), it turns to critical and costly problem [2]. Chronic kidney disease (CKD) is a global health burden with a high economic cost to health system. All stages of CKD are associated with increased risk of mortality, and/or decreased quality of life [3]. In Bangladesh the prevalence is 22.4% [4], which is higher than global rate [5] The overall mortality rate has increased by 41.5% between 1990 and 2017 worldwide [6].

It is estimated that 5-10 million people die annually due to kidney diseases [7]. Malnutrition occurs commonly in the CKD populations [8], although prioritizes medical treatment for CKD patients in Bangladesh, medical nutrition therapy is an area that is largely neglected. Nutritional intervention in early stages of chronic kidney disease may prolong life. Modification of diet reduces levels or concentration of urine parameters of kidney injury [9,10], decrease the production of potential uremic toxin through the alteration of gut flora, controlling body weight and improved cardiovascular outcomes [11]. A kidney friendly diet may help to protect kidneys from further damage. Patients with kidney damage should limit the intake of certain foods to reduce the accumulation of un-excreted metabolic products and also to protect against hypertension, proteinuria and other heart and bone health problems [12].

CKD patients and their clinicians seek ways to modify the kidney disease course in order to reduce the risk of developing end stage renal disease (ESRD), death and other complications of CKD. One such possible avenue is by adopting dietary modifications. Understanding the dietary intake of CKD patients and barriers to its improvement may lead to the formulation of strategies effective at reducing the burden of CKD [13].

Effective management of CKD should lead to longer survival, decreased morbidity, and improved quality of life. Diet is a daily challenge as well as an educational opportunity that interfaces with all other aspects of effective treatment of CKD [14]. Healthful dietary patterns should be encouraged in patients with CKD, and clinicians managing such patients should seek to understand barriers to dietary adherence that are specific to their culture, geographical region and resources. Globally, there has been an increase in CKD morbidity, mortality and disability-adjusted years of life, with an increased burden of CKD. There are many complications related to CKD including anaemia, malnutrition, anorexia, mineral and bone disease, electrolyte disturbances, cardiovascular disease and progression to end-stage kidney disease (ESKD) [15]. Dietary and fluid restrictions are disorienting and an intense burden for patients with CKD. Patient-prioritized education strategies, harnessing patients' motivation to stay well for a transplant or to avoid dialysis, and viewing adaptation to restrictions as a collaborative journey are suggested strategies to help patients adjust to dietary regimens in order to reduce their impact on quality of life [16].

Medication and hemodialysis both are costly, which has become a burden for the families having CKD patients. Without a definite dietary advice, patients may not follow appropriate dietary practices according to their need, which may lead to malnutrition. Such patients observe increased morbidity, a decrease in functional capacity, and a greater number and duration of hospital admission, all of which may cause a low health related quality of life. It is crucial to yield needed data regarding dietary pattern and nutritional status of the CKD patients so that the magnitude of the problem faced by CKD patient can be assessed and invite appropriate steps from responsible communities including policy makers, attending physicians and dieticians.

METHODS

Study design & setting: This was a cross-sectional study conducted from January 2022 to December 2022 at Anwer Khan Modern Medical College hospital and NIKDU, Dhaka.

Study population: 253 patients with chronic kidney disease

Selection Criteria:

Inclusion criteria: Patients of CKD (all stages), age 18 to 65 years. Willing to participate.

Exclusion criteria: Critically ill patient.

Data collection and analysis: Data were collected through face-to-face interview using a pre-tested data collection sheet. Before preceding the data collection, the detail of the study was explained to each eligible patient and written consent from the patient was obtained. The relevant socio-demographic data along with anthropometric data of the patients were collected and recorded. Computer based statistical analysis were carried out with appropriate techniques and systems. Quantitative data were expressed as mean and standard deviation and qualitative data were expressed as frequency distribution and percentage. Statistical analysis was performed by using Statistical Packages for Social Sciences (SPSS version 25). Dietary pattern was assessed with food

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frequency questionnaire, number of major meals per day, light meal, skipped meal for last 7 days. For nutritional assessment, "Asian criteria" BMI cut-off was performed. The patient was then assigned a rating of underweight (<18.5), normal (18.5-22.9), overweight (23-24.9), pre-obese (25-29.9), obese (≥30), obese type-1(30-40), obese type 2 (40.1-50, super obese) and obese type 3 (>50, morbid obese). * Anthropometric parameters, such as height (cm), weight (kg), BMI (kg/m^2) were recorded. Height was measured with measuring tape and weight was measured with weight machine (CAMRY, Model-EB938).

Diet composition was measured with FCS. In Bangladesh, the **Food Consumption Score (FCS)** is a standardized index used by the World Food Programme (WFP) and the Bangladesh Bureau of Statistics (BBS) to assess household food security based on dietary diversity and frequency of consumption over a seven-day period. The Food Consumption Score (FCS) in Bangladesh measures household dietary diversity and quality, categorizing food security into Poor (≤28), Borderline (>28 and ≤42), and Acceptable low (43-52), Acceptable high (>52) with weights adjusted for local staples like rice, fish, and oil [17].

[*WHO Expert Consultation. Appropriate body–mass index for Asian populations and its implications for policy and intervention strategies. Lancet. 2004;363:157–163. doi: 10.1016/S0140-6736(03)15268-3]

Ethical considerations: Ethical clearance of the study was obtained from the Institutional review board of NIPSOM, Bangladesh. Informed written consent was obtained from the respondents after describing the objectives and procedure of the study and ensuring that there was no chance of any physical, mental, social and economic harm to them. Each participant voluntarily took part in the study. Privacy and confidentiality were maintained strictly. Participants had the liberty to refuse to participate at any point of the study. Anonymity of data was maintained and access to data was restricted to the Principal Investigator.

RESULTS

Table-1 shows that about 24% of the respondents belonged to age group 46-55 years, mean (±SD) of the age of the respondents was 52.25 (±13.76) years. Most of the respondents (51.4%.) were male. About 38% of the respondents had their educational qualification up to college, 42% of the respondents were house wife, 79% were married, 36% had monthly income within TK 50,001- 75000.

Table 1 Baseline characteristics of the respondents (n=253)

Baseline characteristics	Frequency	Percentage
Age in years		
18-25	6	2.4
26-35	26	10.2
36-45	55	21.7
46-55	60	23.7
56-65	58	22.9
>65	48	19
mean (±SD)	52.25	(±13.76)
Sex		
Male	130	51.4
Female	123	48.6
Educational status		
Primary school	23	9.1
High school	77	30.4
College	97	38.4
University	54	21.3
Never went to school	2	0.8
Employment status		
House wife	107	42.3
Business	53	20.9
Private job	47	18.6

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Unemployed	35	13.8
Student	10	4
Day labour	1	0.4
Marital status		
Unmarried	13	5.1
Married	200	78.7
Separated, divorced, widowed	40	16.2
Family size		
1-5 persons	188	74.3
>5 persons	65	25.7
Monthly family Income		
25000-50000	58	
50001-75000	91	
75001-100000	59	
>100000	45	

Table 2 shows that 68.7% respondents were pre obese and 14.5% were overweight.

Table 2: Nutritional status of the respondents (n=83)
(Respondents who did not have oedema were assessed for nutritional status by BMI) (As oedema increases the body weight and also BMI, only non-oedematous patients were assessed for the study, where sample size was 83)

Nutritional status	Frequency	Percentage
Normal weight	6	7.2%
Overweight	12	14.5%
Pre obese	57	68.7%
Obese	8	9.6%

Table 3 showed that 85.4% of the respondents took three major meals per day for the last 7 days. 54.2% ate snacks between breakfast and lunch, and 95.7% ate snacks between lunch and dinner. 22.5% skipped any major meal. Most of the respondents (20.1%) skipped breakfast.

Table 3 Dietary pattern as physician advices to follow a healthy dietary pattern for CKD patients) of the respondents for the last 7 days (n = 253)

Characteristics	Frequency	Percentage
Major meal per day		
2 meals	37	14.6
3 meals	216	85.4
Light meal		
Yes (At midmorning)	137	54.2
No (At midmorning)	116	45.8
Yes (At evening)	242	95.7
No (At evening)	11	4.3
Skipping any meal		
Yes	57	22.5
No	196	77.5
Name of skipped meal		
Breakfast	51	20.1
Dinner	6	2.4
Never skip a meal	196	77.5

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Table-4: Distribution of the respondents according the food frequency questionnaire (for last 7 days, n=253)

Food name	Never frequency (percentage)	Once a day frequency (percentage)	2-3times per day frequency (percentage)	4/ more per day frequency (percentage)	Once a week frequency (percentage)	2-3 times per week frequency (percentage)	4/more per week frequency (percentage)
Rice	-	33(13%)	216(85.4%)	4(1.6%)	-	-	-
Roti	74(29.2%)	132(52.2%)	33(13%)	-	10(4%)	4(1.6) %	-
Bread	156(61.7%)	-	-	-	85(33.6%)	12(4.7%)	-
Milk & milk products	124(49%)	18 (7.1%)	-	-	39(15.4%)	49(19.4%)	23(9.1%)
Pulses	127(50.2%)	-	-	-	92(36.4%)	29(11.5%)	5(2%)
Egg	1(0.4%)	163(64.4%)	61(24.1%)	-	5(2%)	11(4.3%)	12(4.7%)
Chicken	68(26.9%)	93(36.8%)	20(7.9%)	-	34(13.4%)	37 (14.6%)	1(0.4%)
Fish	14(5.5%)	131(51.8%)	40(15.8%)	-	8(3.2%)	49(19.4%)	11(4.3%)
Mutton	234(92.5%)	1(0.4%)	-	-	17(6.7%)	1(0.4%)	-
Beef	225(88.9%)	9(3.6%)	-	-	18(7.1%)	1(0.4%)	-
Fruits	42(16.6%)	112(44.3%)	-	-	44(17.4%)	30(11.9%)	25(9.9%)
Vegetables	-	46(18.2%)	176(69.6%)	13(5.1%)	4(1.6%)	14(5.5%)	-
Nuts	246(97.2%)		-	-	3(1.2%)	4(1.6%)	-
Sweet foods like sugar, chocolate, bakery etc.	127(50.2%)	35(13.8%)	-	-	67(26.5%)	20(7.9%)	4(1.6%)
Fatty foods like oil, butter, margarine	-	10(4%)	243(96%)	-	-	-	-

Table 5 showed that majority of the respondents (53.3%) took 1.5 litres of water daily. 31.2% of the respondents took extra salt during meals and 5.9% ate nuts, beans, legumes, pulses. Majority of the respondents (62%) did not strain vegetables prior cooking. 34.4% of the respondents took fruits that are allowed in CKD.

Table 5: Dietary restrictions (According to the physician advice for CKD patients) of the respondents (n = 253)

Characteristics	Frequency	Percentage
Daily water intake		
1 Litre	3	1.2
1.5 Litres	135	53.5
2 Litres	115	45.5
Extra salt intake during meal		
Yes	79	31.2
No	174	68.8
Intake of nut, beans, legumes, pulses		
Yes	15	5.9
No	106	41.9
Sometimes	32	52.2
Straining of vegetables in boiling water prior cooking		
Yes	91	36
No	157	62
Sometimes	5	2
Intake of fruits		

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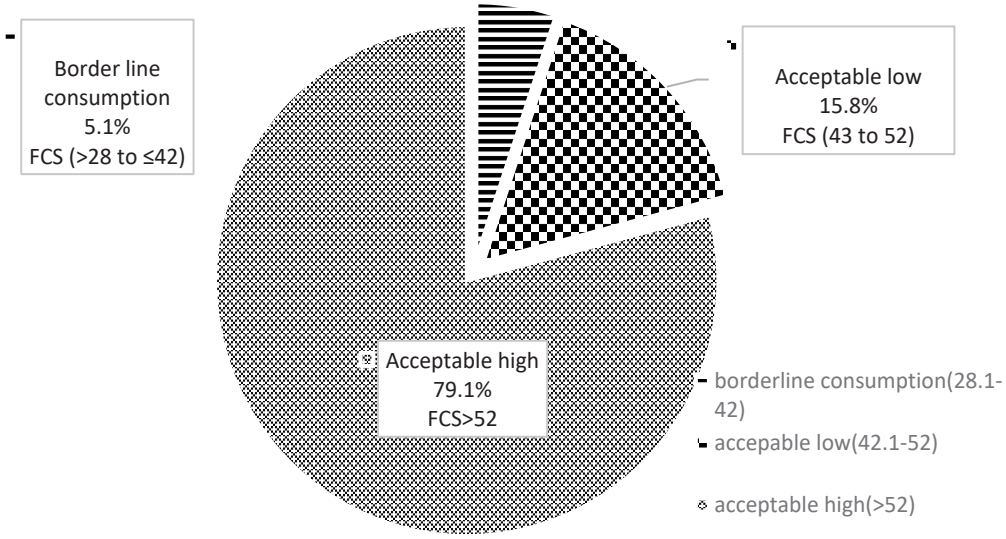
Fruits that are allowed to eat in CKD (apple, guava, papaya, pineapple, pear)	87	34.4
All types of fruits-allowed & not allowed	124	49
Never took fruits	42	16.6

The figure 1shows the majority of the respondents (79.1%) had acceptable high FCS, 15.8% of them Acceptable low consumption. None of the respondents had poor consumption (≤28).

Figure-1: Respondents according the Food Consumption Score **in Bangladesh. (n=253)



[**The Food Consumption Score (FCS) in Bangladesh measures household dietary diversity and quality, categorizing food security into Poor (≤28), Borderline (>28 and ≤42), and Acceptable low (43-52), Acceptable high (>52) with weights adjusted for local staples like rice, fish, and oil].

Table - 6 shows CKD patients of higher age group (>45 years) showed higher proportion of obesity than younger age group (18-45 years) and the difference was significant (p<0.05).

Table-6: Association of different variables with nutritional status (n=253)

Characteristics		Nutritional statusa				*p*-value
		Normal	Over Weight	Pre Obese	Obese	
Dietary pattern (Major meal intake per day)	2 meals (n=37)	1 (2.7%)	6 (16.2%)	22 (59.5%)	8 (21.6%)	(0.471)
	3 meals (n=216)	13 (6%)	20 (9.3%)	124 (57.4%)	59 (27.3%)	
Dietary pattern (Skipped meal)	Yes (n=57)	4 (7%)	6 (10%)	33 (58%)	14 (25%)	(.940)
	No (n=196)	10 (5%)	20 (10%)	113 (58%)	53 (27%)	
Age (years)	18-45 (n=87)	7 (8%)	16 (18.4%)	58 (66.7%)	6 (6.9%)	(0.000)
	>45 (n=166)	7 (4.2%)	10 (6%)	88 (53%)	61 (36.7%)	
Sex	Male (n=130)	5 (3.8%)	14 (10.8%)	82 (63.1%)	29 (22.3%)	(0.209)
	Female (n=123)	9 (7.3%)	12 (9.8%)	64 (52%)	38 (30%)	
Educational	Secondary	6	9	57	30	

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Status	**and below (n=102)**	(5.9%)	(8.8%)	(55.9%)	(29.4%)	(0.791)
	Higher secondary and above (n=151)	8 (5.3%)	17 (11.3%)	89 (58.9%)	37 (24.5%)	

DISCUSSION

This cross-sectional study was conducted to assess the dietary pattern and nutritional status of chronic kidney disease patients. Among 253 respondents, majority belonged to age group 46-55 years where the mean (±SD) of age was 52.25 (±13.76) years. 51.4% of the respondents were male, rest of them were female (48.6%). 38.3% of them passed college, majority of the respondents were housewives (42.3%), 20.9% were businessman and most of the respondents were married (78.7%), 13% of them were widowed.

A study conducted in Bangladesh where the mean (±SD) of age was 48.2 (±16.4) years, 56.2% of the respondents were female, 36.2% were illiterate, 79% of the respondents were married, 49% were housewives [18]. In a study, the mean BMI was 28.5, mean weight was 68.5 kg [19].

According to this study, 85.4% of the respondents took three meals a day and 14.6% of the respondents took two meals a day. This study also revealed that 54.2% of the respondents took light meat at midmorning and 95.7% of them took light meat at evening. A study showed healthy dietary patterns typically encouraged higher intakes of whole grains, vegetables, fish and low-fat dairy, and lower intakes of fruit, legumes, nuts, red and processed meats, sodium, and sugar-sweetened beverages. A healthy dietary pattern reduced the risk of CKD [20]]. The study also observed there was no significant association between major meal intake and nutritional status of the respondents. A study showed that there was significant association between sex and nutritional status, height and nutritional status, weight and nutritional status of CKD patients, but there was no significant association between other socio demographic characteristics and nutritional status of CKD patients [2].

CONCLUSION

The study was conducted to assess the dietary pattern and nutritional status of CKD patients. Here most of the respondents found pre obese, obese and overweight. Most of them took three meals a day. More than half of the respondents took light meal at midmorning and most of them took light meal at evening. Regular dietary and nutritional follow up of the CKD patients should be done for improvement of their quality.

REFERENCES

1. Wang F, He K, Wang J, Zhao MH, Li Y, Zhang L, Saran R, Bragg-Gresham JL. Prevalence and risk factors for CKD: a comparison between the adult populations in China and the United States. Kidney international reports. 2018 Sep 1;3(5):1135-43.
2. Moustakim R, Mziwira M, El Ayachi M, Belahsen R. Assessment of nutritional status, dietary intake and adherence to dietary recommendations in haemodialysis patients. GSC Advanced Research and Reviews. 2020 May 30;3(2):009-19.
3. Hill NR, Fatoba ST, Oke JL, Hirst JA, O'Callaghan CA, Lasserson DS, Hobbs FR. Global prevalence of chronic kidney disease–a systematic review and meta-analysis. PloS one. 2016 Jul 6;11(7):e0158765.
4. Banik S, Ghosh A. Prevalence of chronic kidney disease in Bangladesh: A systematic review and meta-analysis. International Urology and Nephrology. 2021 Apr;53:713-8.
5. Cockwell P, Fisher LA. The global burden of chronic kidney disease. The Lancet. 2020 Feb 29;395(10225):662-4.
6. Bikbov B, Purcell CA, Levey AS, Smith M, Abdoli A, Abebe M, Adebayo OM, Afarideh M, Agarwal SK, Agudelo-Botero M, Ahmadian E. Global, regional, and national burden of chronic kidney disease, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. The lancet. 2020 Feb 29;395(10225):709-33.
7. Luyckx VA, Tonelli M and Stanifer JW. The global burden of kidney disease and the sustainable development goals. Bull WHO 2018; 96: 414–422D.
8. Reza HM, Ahmed AS, Rahman MA, Shuvo SD, Ahmad T, Elahi MT. Comparison of nutritional status between patients from urban area with rural area undergoing hemodialysis in Kushtia district, Bangladesh: A cross-sectional study.

https://doi.org/10.3329/jopsom.v44i2. 89223

Asian Journal of Medical and Biological Research. 2016;2(4):603-10.

9. Goraya, N.; Simoni, J.; Jo, C.; Wesson, D.E. Dietary acid reduction with fruits and vegetables or sodium bicarbonate reduces kidney injury in subjects with moderately reduced GFR due to hypertensive nephropathy. *Kidney Int.* **2012**, *81*, 86–93.
10. Estruch, R.; Ros, E.; Salas-Salvado, J.; Covas, M.I.; Corella, D.; Arós, F.; Gómez-Gracia, E.; Ruiz-Gutiérrez, V.; Fiol, M.; Lapetra, J.; et al. Primary prevention of cardiovascular disease with a Mediterranean diet. *N. Engl. J. Med.* **2013**, *368*, 1279–1290.
11. Goraya, N.; Wessona, D.E. Dietary interventions to improve outcomes in chronic kidney disease. *Curr. Opin. Nephrol. Hypertens.* **2015**, *24*, 505–510.
12. Rysz J, Franczyk B, Ciałkowska-Rysz A, Gluba-Brzózka A. The effect of diet on the survival of patients with chronic kidney disease. Nutrients. 2017 May 13;9(5):495.
13. Banerjee T, Liu Y, Crews DC. Dietary patterns and CKD progression. Blood purification. 2016;41(1-3):117-22.
14. Biruete A, Jeong JH, Barnes JL, Wilund KR. Modified nutritional recommendations to improve dietary patterns and outcomes in hemodialysis patients. Journal of Renal Nutrition. 2017 Jan 1;27(1):62-70.
15. Kalantar-Zadeh K, Tortorici AR, Chen JL, Kamgar M, Lau WL, Moradi H, Rhee CM, Streja E, Kovesdy CP. Dietary restrictions in dialysis patients: is there anything left to eat?. InSeminars in dialysis 2015 Mar (Vol. 28, No. 2, pp. 159-168).
16. Palmer SC, Hanson CS, Craig JC, Strippoli GF, Ruospo M, Campbell K, Johnson DW, Tong A. Dietary and fluid restrictions in CKD: a thematic synthesis of patient views from qualitative studies. American Journal of Kidney Diseases. 2015 Apr 1;65(4):559-73.
17. Household Food Security and Nutrition Assessment (HFSNA) 2009, WFP, UNICEF, IPHN.
18. Sarker MH, Moriyama M, Rashid HU, Chisti MJ, Rahman MM, Das SK, Uddin A, Saha SK, Arifeen SE, Ahmed T, Faruque AS. Community-based screening to determine the prevalence, health and nutritional status of patients with CKD in rural and peri-urban Bangladesh. Therapeutic Advances in Chronic Disease. 2021 Jul;12:20406223211035281.
19. Ikizler TA. A patient with CKD and poor nutritional status. Clinical Journal of the American Society of Nephrology. 2013 Dec 6;8(12):2174-82.
20. Bach KE, Kelly JT, Palmer SC, Khalesi S, Strippoli GF, Campbell KL. Healthy dietary patterns and incidence of CKD: a meta-analysis of cohort studies. Clinical Journal of the American Society of Nephrology. 2019 Oct 7;14(10):1441-9.

https://doi.org/10.3329/jopsom.v44i2. 89223