RESEARCH PAPER

Assessment of Nutritional Status among Patients with Chronic Kidney Disease (CKD) in a Tertiary Hospital in Kamrup (M), Assam

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ABSTRACT

Chronic kidney disease (CKD) is a major global public health concern and is often associated with nutritional complications, particularly protein–energy wasting, which contributes to increased morbidity and mortality. This study aimed to assess the nutritional status of patients with CKD and examine its association with the clinical parameters. A cross-sectional observational study was conducted among 150 patients with CKD aged between 35–55 years attending a tertiary care hospital in Kamrup (M), Assam. Socio-demographic and clinical information were collected using a structured interview schedule, while nutritional status was assessed through Body Mass Index (BMI), Subjective Global Assessment (SGA) and 24-hour dietary recall. Biochemical parameters including hemoglobin, serum albumin, serum creatinine, potassium, and sodium were obtained from hospital laboratory records. The findings of the study revealed that majority of patients were in Stage 3 CKD (40%), followed by Stage 4 (26.25%) and Stage 5 (18.75%). Although 81.25% of respondents had normal BMI, the SGA scores revealed that 40% were moderately malnourished, indicating that BMI alone may underestimate malnutrition in CKD. Dietary assessment showed inadequate intake, with mean energy intake of 27.5 kcal/kg/day and protein intake of 0.55 g/kg/day, both below recommended levels. Biochemical findings demonstrated a high prevalence of anemia (92.5%) and hypoalbuminemia (60%). These findings highlight the importance of comprehensive nutritional assessment and early dietary intervention as integral components of CKD management to improve patient outcomes.

Keywords: Chronic kidney disease, Clinical, Dietary assessment, Malnutrition, Protein-Energy Wasting

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Introduction

Chronic kidney disease (CKD) is increasingly recognized as a major global public health problem, characterized by a progressive decline in renal function and structural kidney damage lasting more than three months. Epidemiological evidence suggests that approximately 10–15% of the adult population is affected by CKD, with rising prevalence due to ageing populations and increasing rates of metabolic disorders like diabetes and hypertension.(Chung et al., 2012; Schofield, 2006) Beyond the need for renal replacement therapy, CKD is associated with multiple comorbidities, including cardiovascular disease, infections and nutritional abnormalities. Malnutrition, particularly protein–energy wasting, is a frequent and serious complication in CKD patients (Fouque et al., 2014) Malnutrition in CKD is multifactorial and results from reduced dietary intake, increased nutrient losses, altered metabolism, inflammation, metabolic acidosis, gastrointestinal disturbances and hormonal dysregulation.(Donders et al., 2022; Ouyang et al., 2022)

This condition is associated with reduced muscle mass, hypoalbuminemia, increased susceptibility to infections, disease progression, and higher mortality rates.(Jaques et al., 2024) The Kidney Disease: Improving Global Outcomes (KDIGO) classification stratifies CKD based on estimated glomerular filtration rate (eGFR) and albuminuria, categorizing the disease into five stages from G1 to G5.(Kidney Disease: Improving Global Outcomes [KDIGO], 2013) Declining eGFR is associated with increasing metabolic disturbances, inflammation, cardiovascular risk, and nutritional impairment.(Levey et al., 2011) The risk of malnutrition rises substantially in advanced stages due to reduced intake and chronic inflammation(Ikizler et al., 2020) making nutritional assessment a critical component of CKD management.

Nutrition plays a central role in slowing CKD progression and improving outcomes. Excessive protein intake increases intraglomerular pressure and nitrogenous waste production, potentially accelerating disease progression (Brenner et al., 1982) Accordingly, KDIGO guidelines recommend avoidance of high protein intake and support moderate protein restriction in non-dialysis CKD patients.(Kalantar-Zadeh & Fouque, 2017) Adequate energy intake is equally essential, as insufficient caloric intake promotes muscle catabolism and worsens nutritional status.(Ikizler, 2020) Sodium restriction also plays a key role in blood pressure control and prevention of fluid overload.(McMahon et al., 2013)

The prevalence of malnutrition in CKD varies widely depending on disease stage, assessment methods, and population characteristics. Meta-analytical evidence suggests a pooled global prevalence of approximately 40%.(Gu et al., 2021). Despite guideline recommendations, no single gold-standard tool exists for nutritional assessment in CKD. Therefore, local studies are essential to assess nutritional status and guide interventions. This study aimed to assess the nutritional status of CKD patients using standardized tools and to determine its relationship with clinical outcomes.

Materials and Methods

Sample Selection

A cross-sectional observational study was conducted among patients with CKD attending Apollo Hospitals Unit, International Hospital, Guwahati. A total of 150 patients were selected using purposive sampling. Institutional Ethical Clearance was obtained from Assam Royal Global University, Guwahati, and informed consent was obtained from all participants.

Inclusion criteria: Adults aged 35-55years, diagnosed with CKD and respondents who are willing to provide informed consent.

Exclusion: Patients with acute kidney injury, individuals with active malignancies or terminal illness and pregnant or lactating women.

Data collection

A structured and pre-tested interview schedule was conducted to collect information about the socio-demographics of the respondents, including gender, age, education, marital status, income status, height, weight and whether the risk of high blood pressure, diabetes, gout, coronary heart disease, cerebral infarction and CKD stage, whether long-term hemodialysis. Fast-fasting blood samples were collected on the second day after hospitalization, albumin (ALB) and hemoglobin (Hb) were checked and measured by hospital laboratory. Subjective Global Assessment (SGA) was used to evaluate the nutritional status. 24 hour dietary recall method was used to assess the dietary intake of nutrients among the respondents.

Statistical analysis

Quantitative data that obeyed a normal distribution were expressed as mean ± standard deviation (X ± SD). Pearson's correlation analysis was done to assess the correlation between variables.

Results and Discussion

Socio-Demographic Profile

The age distribution (Fig. 1) showed that 43.75% of respondents were aged 50–60 years, followed by 32.50% in the 40–50-year group. This trend aligns with evidence indicating increasing CKD prevalence with advancing age due to cumulative metabolic risk factors.(Jha et al., 2013). Male predominance (54%) in the sample was observed (Fig 2), which is again consistent with previous studies suggesting gender disparities in disease epidemiology and healthcare access.(Carrero et al., 2018)

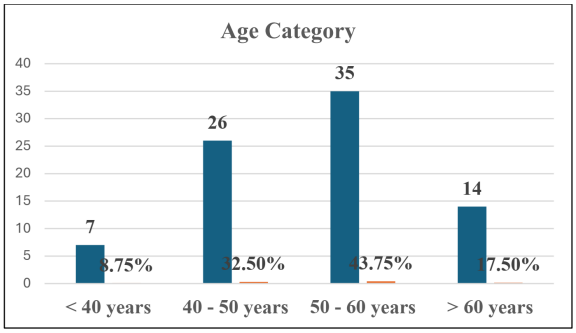


Fig 1. Distribution of respondents according to age group

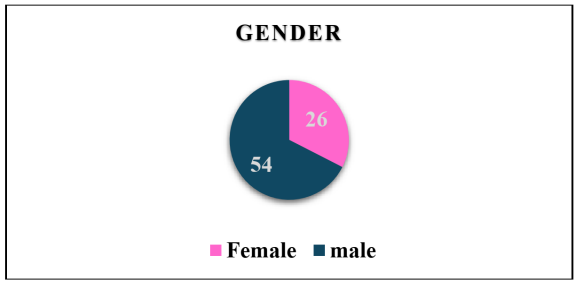


Fig 2. Distribution of respondents according to gender

Disease Profile

Diabetes mellitus was the most common comorbidity (51.25%) among the respondents, followed by hypertension (23.75%), while 15% of the respondents had both conditions (Table 1). These findings support global evidence identifying diabetes and hypertension as leading causes of CKD. (Hill et al., 2016) Most patients were in Stage 3 CKD (40%), followed by Stage 4 (26.25%) and Stage 5 (18.75%) (Table 2), indicating late presentation, a common issue in developing regions.(Stanifer et al., 2014)

Table 1. Distribution of Comorbidities among Respondents

Comorbidities	No of patients	Percentage
Diabetes Mellitus (DM)	41	51.25%
Hypertension (HTN)	19	23.75%
Both DM and HTN	12	15.00%
Others(Dyslipidemia, hyperthyroidism)	8	10.00%

The distribution of patients according to CKD stage demonstrated that the majority were in Stage-3 (40.00%), followed by Stage-4 (26.25%) and Stage-5 (18.75%), whereas 15.00% were in Stage-2 and none were in Stage-1. This pattern suggests that many patients are diagnosed or referred at moderate to advanced stages of the disease, highlighting the need for early screening, timely diagnosis, and preventive interventions to slow disease progression Late presentation of CKD has also been documented in other studies, particularly in developing regions, where limited awareness and delayed referral contribute to diagnosis at advanced stages (Stanifer *et al.*, 2014).

Table 2. Distribution of Respondents According to Disease Stage

CKD stage	No of patients	Percentage
Stage-1	0	0.00%
Stage-2	12	15.00%
Stage-3	32	40.00%
Stage-4	21	26.25%
Stage-5	15	18.75%

Nutritional Status

Despite 81.25% of the respondents having normal BMI, 13.75% were underweight (Table 3). BMI alone failed to identify malnutrition, as SGA revealed that 40% of patients were moderately malnourished (Table 4). This discrepancy highlights the limitations of BMI in CKD patients, where fluid retention and muscle wasting may mask malnutrition.(Fouque et al., 2008; Kalantar-Zadeh et al., 2001)

Table 3. Distribution of Respondents According to Body Mass Index (BMI)

BMI	Percentage
>18.5 (Underweight)	13.75%
18.5-24.9 (Normal)	81.25%
25-29.9 (Overweight)	5.00%
30-34.9 (Obesity I)	0.00%
35-39.9 (Obesity II)	0.00%

Dietary assessment among the respondents showed mean energy intake of 27.5 kcal/kg/day, representing a 15.4% deficit from recommendations. Protein intake was also inadequate (0.55 g/kg/day), with a 21.4% deficit, increasing the risk of muscle wasting and poor outcomes.(Kopple, 2001)(Fouque et al., 2008) Fat intake accounted for only 22.5% of total energy, further contributing to overall energy deficiency.(Kalantar-Zadeh et al., 2006) These findings emphasize the need for individualized nutritional counseling in CKD patients.(Ikizler, 2020)

Table 4. Nutritional Status of the Respondents Based on SGA Score

SGA Score	Percentages
Well nourished (7-14)	60%
Moderately Malnourished (15-28)	40%
Severly Malnourished (29-35)	0%

Table 5: Nutrient Intake of the Respondents Based on 24-Hour Dietary Recall

Nutrients	Mean Intake	Recommended Dietary Allowance (RDA)	%of RDA Achieved	% Deficit from RDA
Energy(Kcal)	27.5 kcal/kg body weight/ day	32.5 kcal/kg body weight/day	86.4%	15.4 %
Protein (g)	0.55	0.7	78.6	21.4
Fats (g)	22.5% of total energy	30% of total energy	75%	25%

Clinical Parameters

A high prevalence of anaemia (Table 6)was observed with 92.5% of patients having haemoglobin levels below normal, reflecting impaired erythropoietin production and inflammation.(Stauffer & Fan, 2014) Hypoalbuminemia was present in 60% of patients, indicating poor nutritional status and increased morbidity risk.(Kalantar-Zadeh et al., 2003) Elevated serum creatinine was observed in 98.75% of patients, confirming advanced renal impairment.(Levey et al., 2005) Electrolyte disturbances, including hyperkalemia and hyponatremia, were also noted, consistent with CKD-related metabolic derangements.(Kovesdy, 2015; Rhee et al., 2015)

Table 6: Biochemical Profile of the Respondents

Biochemical Parameters	Mean ± SD	Reference Range	Percentage of Patients below Normal (%)	Percentage of Patients Above Normal (%)
Haemoglobin (g/dL)	10.07 ± 1.42	12–16	92.5%	0%
Serum Albumin (g/dL)	3.44 ± 0.58	3.7 – 5.0	60%	0%
Serum	4.78	0.6 –	0%	98.75%

Creatinine (mg/dL)	± 2.69	1.3 mg/dL		
Serum Potassium (mEq/L)	4.93 ± 0.77	3.5–5.0	53.2%	41.8%
Serum Sodium (mEq/L)	135. 33 ± 4.88	135–145	25%	0%

Conclusion

The study demonstrates that malnutrition is highly prevalent among patients with chronic kidney disease and is frequently under-recognized when relying solely on anthropometric measures such as BMI. Comprehensive assessment using SGA, dietary evaluation, and biochemical markers revealed significant nutritional deficits, anaemia, and hypoalbuminemia. These findings underscore the importance of integrating routine nutritional screening and individualized dietary management into standard nephrology care. Early nutritional intervention may reduce complications, improve metabolic stability, and enhance overall prognosis and quality of life in CKD patients.

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Conflict of interest

The author(s) do not have any conflict of interest.

Data availability statement

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics statement

The human experimental procedures were reviewed and approved by the Institutional Ethics Committee (IAEC) of Apollo Hospitals, Guwahati on 14/06/2023. All experiments were conducted in accordance with relevant national and international guidelines.

Informed consent statement

Prior consent was taken by the respondents before commencement of the research. The informed consent was designed as per the guidelines of Apollo Hospitals, Guwahati, Assam.

Author contribution

Jebin Sultana has conducted the entire research and drafted the manuscript. Priyanka Bhattacharyya has guided the research as the major advisor and assisted in the drafting of the manuscript.

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