



Shaping Tomorrow's Nephrology: Insight-Driven Kidney Care

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Validity of a Self-Dietary Assessment Nutrition Application (Nutrirodcal) for Estimating Protein Intake in Patients with Chronic Kidney Disease

Chantisa Arayangkoon

Department of Internal Medicine-Nephrology, Rajavithi Hospital, College of Medicine, Rangsit University, Thailand

Objectives : To evaluate the validity of a self-dietary assessment nutrition application (www.nutrirodcal.com) in estimating dietary protein intake compared with protein intake derived from 24-hour urinary urea nitrogen in patients with predialysis CKD.

Methods : This prospective validation study enrolled adult patients with CKD stages 3–5 who had not received kidney replacement therapy. Participants recorded their daily dietary intake using the Nutrirodcal application. Dietary protein intake (DPI) estimated by the application was compared with normalized protein equivalent of total nitrogen appearance (nPNA), calculated from 24-hour urinary urea nitrogen collections, at weeks 4, 8, and 12. Agreement and correlation between methods were evaluated using intraclass correlation coefficients (ICC) and Pearson's correlation coefficients.

Results : A total of 21 patients (mean age 60 ± 9.9 years; 57% male) were included. Mean nPNA and application-derived DPI were comparable across all time points. The ICC between nPNA and DPI demonstrated moderate agreement at week 4 (ICC = 0.469, $p = 0.014$), week 8 (ICC = 0.510, $p = 0.008$), and week 12 (ICC = 0.413, $p = 0.028$). Pearson's correlation coefficients showed significant correlations at week 4 ($r = 0.485$, $p = 0.026$) and week 8 ($r = 0.510$, $p = 0.018$), with a borderline correlation at week 12 ($r = 0.414$, $p = 0.062$). Subgroup analyses suggested stronger correlations in patients with CKD stages 3–4 and in those with body mass index $> 23 \text{ kg/m}^2$.

Conclusions : The Nutrirodcal self-dietary assessment application demonstrated acceptable validity for estimating dietary protein intake in patients with pre-dialysis CKD when compared with 24-hour urinary urea nitrogen–derived nPNA. This digital tool may serve as a practical adjunct for nutritional monitoring and counseling in routine CKD care.

Base line characteristic and compare baseline and after intervention.png



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Baseline characteristics of participants (n = 21)

Variable	Value
Age (years)	60 ± 9.87
Male sex, n (%)	12 (57.14)
Hypertension, n (%)	19 (90.48)
Diabetes mellitus, n (%)	10 (47.62)
Dyslipidemia, n (%)	10 (47.62)
CKD stage 3, n (%)	8 (38.10)
CKD stage 4, n (%)	9 (42.86)
CKD stage 5, n (%)	4 (19.05)
Body weight (kg)	66.29 ± 10.69
BMI (kg/m ²)	25.24 ± 3.43
Systolic blood pressure (mmHg)	135.95 ± 20.03
Fasting plasma glucose (mg/dL)	115.29 ± 34.28
BUN (mg/dL)	33.67 ± 11.54
Serum creatinine (mg/dL)	2.61 ± 1.09
eGFR (mL/min/1.73 m ²)	27.86 ± 13.35
Sodium (mEq/L)	140.70 ± 1.69
Potassium (mEq/L)	4.22 ± 0.35
Calcium (mg/dL)	9.36 ± 0.35
Phosphorus (mg/dL)	3.70 ± 0.51
Albumin (g/dL)	4.16 ± 0.45

Data are presented as mean ± SD or number (%).

Comparison of clinical and nutritional parameters before and after intervention

12 weeks

Variable	Baseline	After 12 weeks	p-value
Body weight (kg)	66.29 ± 10.69	66.04 ± 11.59	0.695
BMI (kg/m ²)	25.24 ± 3.43	24.55 ± 3.43	0.024
Systolic BP (mmHg)	135.95 ± 20.03	139.14 ± 14.85	0.451
Fasting plasma glucose (mg/dL)	115.29 ± 34.28	111.24 ± 37.67	0.309
BUN (mg/dL)	33.67 ± 11.54	35.76 ± 15.28	0.307
Creatinine (mg/dL)	2.61 ± 1.09	2.93 ± 1.70	0.063
eGFR (mL/min/1.73 m ²)	27.86 ± 13.35	28.24 ± 15.73	0.678
Sodium (mEq/L)	140.70 ± 1.69	140.76 ± 1.55	0.830
Potassium (mEq/L)	4.22 ± 0.35	4.44 ± 0.47	0.059
Calcium (mg/dL)	9.36 ± 0.35	9.41 ± 0.40	0.588
Phosphorus (mg/dL)	3.70 ± 0.51	3.79 ± 0.60	0.413
Albumin (g/dL)	4.16 ± 0.45	4.06 ± 0.43	0.047

Paired t-test was used for normally distributed variables.

Base line characteristic and compare baseline and after intervention.png

Agreement between nPNA and DPI using Intraclass Correlation Coefficient (ICC)

Time point	nPNA (g/kg/day)	DPI (g/kg/day)	ICC (95% CI)	p-value
4 weeks	0.800 ± 0.156	0.749 ± 0.202	0.469 (0.057–0.744)	0.014
8 weeks	0.742 ± 0.197	0.744 ± 0.195	0.510 (0.111–0.767)	0.008
12 weeks	0.737 ± 0.234	0.766 ± 0.225	0.413 (0.011–0.711)	0.028

ICC: Intraclass correlation coefficient.

Pearson correlation between nPNA and DPI

Time point	Correlation coefficient (r)	p-value
4 weeks	0.485	0.026
8 weeks	0.510	0.018
12 weeks	0.414	0.062