Abstract No:WCN26-AB-6259

DEVELOPMENT AND VALIDATION OF A SIMPLIFIED DIETARY ASSESSMENT TOOL FOR CKD RISK SCREENING IN SINGAPORE

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INTRODUCTION

Chronic kidney disease (CKD) is a progressive condition associated with high mortality, particularly in advanced stages. Poor dietary quality represents a modifiable risk factor for CKD development. Traditional dietary assessment methods such as 24-hour dietary recalls and food frequency questionnaires are resource-intensive and less scalable for large population screenings. This study aimed to develop and validate a brief, self-administered dietary assessment tool specifically designed for individuals at high risk for CKD in Singapore's multi-ethnic population.

METHODS

- A literature review identified CKD-related eating behaviours, guiding the development of a 9-item questionnaire.
- Responses were scored on a 5-point frequency scale and weighted to their association to diabetes and hypertension risk, yielding a total possible score of 0–48, with higher scores indicating better dietary quality.
- Participants underwent comprehensive assessment including demographic profiling, anthropometric measurements and biochemical testing.
- The tool underwent 2 phases validation: initial pilot testing in a CKD screening clinic (n=255), followed by refinement and validation in a larger cohort (n=746) between February 2022 and February 2025.
- Internal consistency was evaluated using Cronbach's alpha and associations between dietary scores and CKD risk were analyzed using multivariable binary logistic regression.
- Statistical significance was set at $p<0.05$.

RESULTS

- The validation cohort comprised 746 adults with 33.1% had at least one comorbidity and 35.7% present impaired kidney function (Table 1).
- The questionnaire demonstrated acceptable internal consistency (Cronbach's alpha = 0.676).
- Based on the questionnaire, most participants reported healthier behaviours including requesting less or no added sugar in beverages (42.4%) and reduced salt or sauces in meals (48.4%) (Figure 1).
- Multivariable analysis revealed that each one-point increase in dietary quality score was associated with a significant 2.7% reduction in odds of impaired kidney function (OR=0.97, 95% CI:0.95-1.00, p=0.028) after adjusting for age, gender, ethnicity, comorbidities, BMI, waist circumference and HbA1c (Table 2).

Table 1: Characteristics of participants (n= 746)

Characteristics		
Gender, n (%)	Male	327 (43.8)
	Female	419 (56.2)
Race, n (%)	Chinese	565 (75.7)
	Non- Chinese	181 (24.3)
Age (year)[1]		48.4 ± 13.6
Comorbidity, n (%)[2]	Yes[3]	246 (33.1)
	No	497 (66.9)
Impaired Kidney Function (eGFR < 90 mL/min/1.73m²), n (%)	Yes	266 (35.7)
	No	480 (64.3)
Body Mass Index (BMI)(kg/m²)[1]		25.1 ± 5.0
Waist Circumference (cm)[1]	Male	92.4± 11.6
	Female	84.2 ± 11.7
HbA1c (%)[1]		5.43 ± 0.72

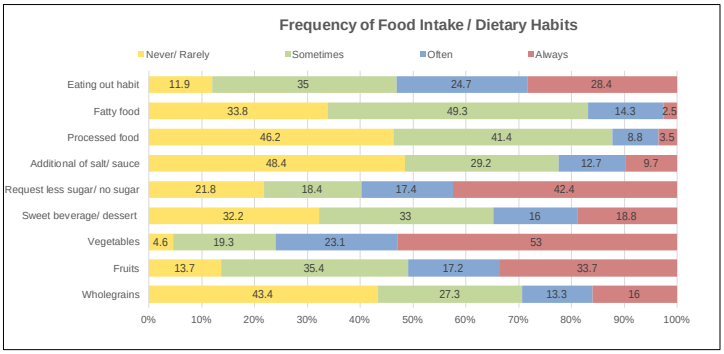
[1]Mean ± standard deviation
[2]Total 3 subjects were excluded due to missing data
[3]Comorbidity define as Yes when there is presence of one of the comorbidity (Diabetes Mellitus, Hypertension, CKD, Hyperlipidemia, Stroke or Heart diseases)

Table 2: The association of Total Dietary Quality Score and impaired kidney function

Variables	OR (95%CI)^	p-value
Total Dietary Quality Score	0.97 (0.95-1.00)	0.028*

^ Case was adjusted on for age, gender, ethnicity, comorbidities, BMI, waist circumference and HbA1c
*Statistical significance

Figure 1: Frequency of 9- item dietary assessment questionnaire



CONCLUSION

This validated 9-item dietary assessment questionnaires demonstrates acceptable reliability and significant association with kidney function in a diverse Asian population. It provides a scalable low resource approach for dietary risk assessment in CKD prevention programmes and popular health screening initiatives.