

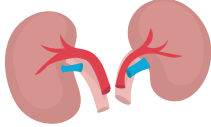
A Retrospective Cohort Analysis of Urine Albumin Creatinine Ratio and Kidney Failure Risk Equation for Chronic Kidney Disease in Malaysia



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INTRODUCTION



Chronic kidney disease (CKD) is one of the major global health concerns. In Malaysia, the prevalence of end-stage kidney disease (ESKD) is among the world's highest, fuelled by an aging population, demographic changes, and increased prevalence of diabetes, hypertension, and obesity. While early detection is hindered by asymptomatic onset and low awareness, timely intervention for high-risk patients is vital to prevent ESKD, improve outcomes, and reduce healthcare costs.

Although the urine albumin creatinine ratio (ACR) and risk stratification by Kidney Failure Risk Equation (KFRE) scoring are critical for early detection and management of high-risk CKD patients, its application in managing CKD patients in Malaysia is not well-documented. This study aims to determine the prevalence of CKD and evaluate the real-world application of urine ACR testing and KFRE scoring in a Malaysian private healthcare setting.

METHOD

This is a retrospective observational study using 196,467 adult eGFR records (August–September 2025) extracted from laboratory information system of Premier Integrated Labs Sdn Bhd's Malaysian network, leveraging demographic and clinical data (eGFR, urine ACR, KFRE scores) to evaluate CKD prevalence and urine albumin testing patterns.

RESULTS

Analysis of 196,467 eGFR records (52% female, median age 47 years) revealed that 9.5% of patients (n=18,617) had CKD Stages 3 to 5 (Table I), a prevalence lower than previously reported^{1,2}. The identified CKD group showed male predominance (55%) at median of 67 years old. Male patients consistently showed higher representation in all advanced CKD Stages 3a to 5, with male-to-female ratios ranging from 1.42 to 1.10. The prevalence of CKD stage 4-5 increased sharply after age 60, peaking at 66-75 years. Late-stage disease (Stages 4–5) affected 4.3% of the cohort (n=8,498), with CKD Stage 5 alone representing over one-third of all CKD cases, highlighting a substantial need for renal replacement therapy (Figure 1). The aetiology of this pattern is unclear but may reflect aggressive disease, rapid progression, or diagnostic delays.

Analysis of 21,622 urine ACR records by these patients, albuminuria severity strongly correlated with CKD stage. Severely elevated albuminuria (>30 mg/mmol) rose sharply from 19.3% in CKD Stage 3a to 71.3% in CKD Stage 5 (Table II). Alarminglly, 10.5% of Stage 1 and 22.9% of Stage 2 patients already had elevated albuminuria, identifying them as high-risk for early kidney damage.

Although effective, KFRE utilization was low; it was requested for a mere 8% of eligible patients (Stages 3a to 5, n=1,486). In cases where it was applied, the 5-year score identified the highest-risk group, and the 2-year score provided supplementary stratification (Table III). The significant concordance (55%) between the high-risk groups for both timeframes validates the model and endorses a tiered approach to guide more intensive therapy.

References

1.Hooi LS and Ong LM (Eds) 32nd Report of the Malaysian Dialysis and Transplant Registry 2024

2.https://www.thestar.com.my/news/nation/2025/01/16/surge-in-dialysis-demand-expected-as-socso-expands-facilities-says-sim

CONCLUSIONS

In summary, analysis of this cohort identifies a significant public health challenge centred on the late detection of CKD, with over one-third of patients initially presenting at CKD Stage 5. The data delineate distinct demographic patterns, identifying males and individuals aged over 60 as disproportionately affected. Concurrently, screening practices reveal substantial gaps, including the profound underutilization of KFRE-based risk assessment and a common reliance on isolated albuminuria testing. These findings collectively underscore the imperative for a strategic shift towards proactive, demographically targeted screening and the integrated use of validated prognostic tools to facilitate earlier intervention and curb the rising incidence of kidney failure.

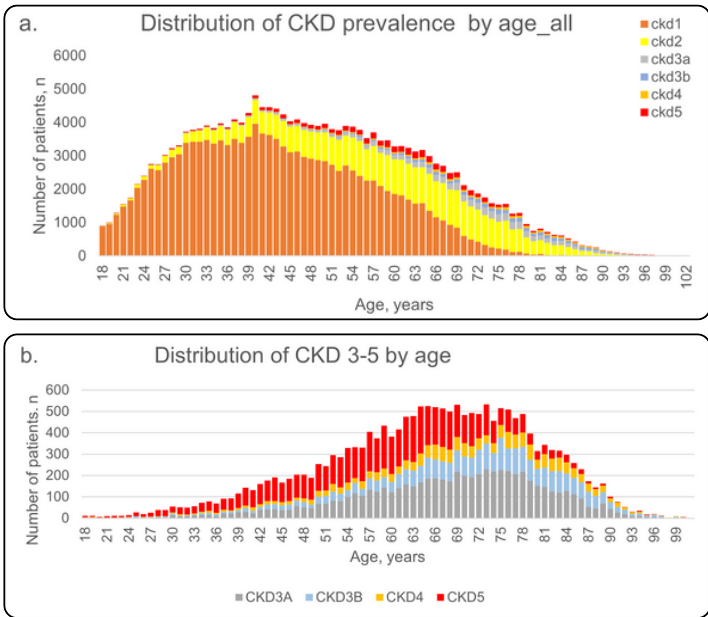


Figure 1. a: Distribution of all subjects in the study CKD stages 1-5, by age
b. Prevalence of CKD Stages 3-5, by age

Table I: Classification of all subjects into CKD classification.

Sex \ CKD Stages	CKD Stages						Total
	1	2	3a	3b	4	5	
F	76279	16805	2728	1621	1066	2986	101485
M	57166	27600	3881	1889	1161	3285	94982
Total	133445	44405	6609	3510	2227	6271	196467

Table II: Urine ACR level for 21622 data.

CKD	ACR, mg/mmol			Grand Total
	<3	3-30	>30	
1	14053	1360	294	15707
2	3163	670	276	4109
3a	370	269	153	792
3b	135	190	178	503
4	52	81	204	337
5	26	24	124	174
Total	17799	2594	1229	21622

Table III: KFRE risk scoring for 1486 data.

CKD3 to 5	KFRE, 2 years				Total
	L	M	H	n/a	
KFRE, 5 years	L	859			859
	M	219			219
	H	120	65	223	408
	n/a			17131	17131
Total	1198	65	223	17131	18617

